教育部高职高专规划教材

高职高专计算机系列规划教材

计算机专业英语

（第 3 版）

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内 容 简 介

本书共分 6 个单元。第 1 单元介绍计算机硬件基础，分别讲述处理器、存储器和输入/输出技术。第 2 单元是计算机软件知识部分，包括 C 语言、数据结构、操作系统、编译原理及数据库技术。第 3 单元是多媒体及应用方面的知识，包括多媒体、图形图像、CAD、计算机动画和多媒体应用软件。第 4 单元是计算机网络相关知识介绍，包括计算机网络基础、互联网搜索引擎、无线网络技术及网络安全。第 5 单元讲述电子商务方面的内容，包括电子商务基础、EDI 和网络广告。第 6 单元介绍计算机领域的新技术，包括人工智能、虚拟现实和神经网络。

本书可作为高职高专计算机应用及相关专业的教材，也可供广大计算机专业技术人员学习和参考。

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前　言

“计算机专业英语”是计算机应用及相关专业高职高专类学生的必修课程。这门课程的开设，对于提高学生的专业词汇量、加强学生对专业文献的阅读能力以及书写技术报告的能力都将打下坚实的基础；同时，为以后工作中解决与计算机专业英语相关的问题提供必要的知识保证。

本书在《计算机专业英语（第 2 版）》的基础上，替换和修改了大量的课文及阅读材料，并将原来的 4 个单元扩展为 6 个单元，课文数量也由原来的 20 篇增加到 23 篇。

本教材涵盖计算机硬件基础、软件知识、多媒体技术、计算机网络、电子商务以及专业前沿知识等计算机专业技术内容。其特点是：①计算机专业知识丰富，包含了计算机专业的多门专业基础课和专业课内容；②专业知识系统性强，注重理论与实践的结合以及与其他专业课内容的衔接与知识补充；③选取的资料内容新颖、难度适当、可读性高；④每篇阅读课文后均附有重点词汇、课文难点注释、练习及一篇与课文内容相关的阅读材料；⑤书后附有所有专业文章的参考译文和习题答案；⑥附录列出了常用的计算机专业词汇和缩写词。

本书由上海交通大学技术学院教师卜艳萍任主编，并完成 Unit 1、Unit 2、Unit 3、Unit 6 的 6.1、附录 A 和附录 B 内容的编写以及全书的审校、统稿工作；华东理工大学的周伟任副主编，并编写了 Unit 4、Unit 5 和 Unit 6 的 6.2、6.3 部分内容。赵桂钦、陈绍东、何飞、周风波、刘雅琴、周烨晴等参加了本书的资料整理工作，并对本书结构和内容组织给出了很好的建议。在此对各位的辛勤工作表示衷心的感谢。

由于编者水平有限，错漏及不当之处恳请同行与读者批评指正。

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2009 年 6 月于上海

目　　录

Unit 1 Hardware Basics

1.1 Central Processing Unit

1.1.1 Text

The hardware of a digital computer system is divided into four functional sections. The block diagram of Fig. 1-1 shows the four basic units of simplified computer: the input unit, central processing unit (CPU), memory unit, and output unit. Each section has a special function in terms of overall computer operation.

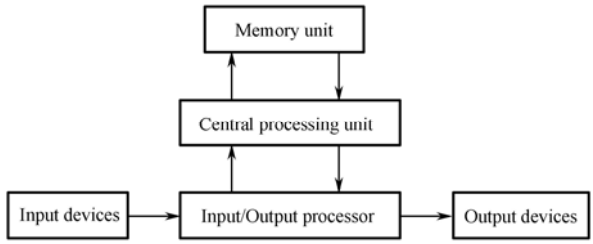

Fig. 1-1 Block diagram of a digital computer

The CPU is the heart of the computer system. It is responsible for performing all arithmetic operations and logic decisions initiated by the program. In addition to arithmetic and logic functions, the CPU controls overall system operation.

The input and output units are the means by which the CPU communicates with the outside world. The input unit is used to input information and commands to the CPU for processing. For instance, a keyboard can be used to input a new program. After processing, the information results must be output. This output of data from the system is performed under control of the output unit. The memory unit of the computer is used to store information such as numbers, names and addresses. In the computer system, memory is divided into two different sections, known as main storage and auxiliary storage.

A computer can solve series of problems and make hundreds, even thousands of logical decisions without becoming tired or bored. It can find the solution to a problem in a fraction of the time, it takes a human being to do the job. A computer can replace human beings in dull and routine tasks, but it has no originality; it works according to the instructions given to it and cannot exercise any value judgements. But a computer can carry out vast numbers of arithmetic logical operations almost instantaneously.

The CPU in a microcomputer is actually the one relatively small integrated circuit or chip. Although most CPU chips are smaller than a lens of a pair of glasses, the electronic components they contain would have filled a room a few decades ago.[1] Using advanced microelectronic techniques,

manufacturers can cram tens of thousands of circuits into tiny layered silicon chips that work dependably and use less power. The CPU coordinates all the activities of the various components of the computer. It determines which operations should be carried out, and what is the order. The CPU can also retrieve information from memory and can store the results of manipulations back into the memory unit for later reference.

The basic job of computers is the processing of information. For this reason, computers can defined as devices which accept information in the form of instructions called a program and characters called data, perform mathematical and logical operations on the information, and then supply results of these operations. The program, which tells the computers what to do and the data, which provide the information needed to solve the problem, are kept inside the computer in a place called memory. [2]

Computers are thought to have many remarkable powers. However, most computers, whether large or small, have three basic capabilities.

First, computers have circuits for performing arithmetic operations, such as addition, subtraction, division, multiplication and exponentiation.

Second, computers have a means of communicating with the user. After all, if we couldn't feed information in and get results back, these machines would not be of much use.

Third, computers have circuits which can make decisions. The kinds of decisions which computer circuits can make are of the type: Is one number less than another? Are two numbers equal? And, is one number greater than another?

A CPU can be a single microprocessor chip, a set of chips, or a box of boards of transistors, chips, wires, and connectors. Differences in CPUs distinguish mainframes, mini-computers and micro-computers. A processor is composed of two functional units: a control unit and an arithmetic/ logic unit, and a set of special workspaces called registers.

The control unit

The control unit is the functional unit that is responsible for supervising the operation of the entire computer system. In some ways, it is analogous to a telephone switchboard with intelligence because it makes the connections between various functional units of the computer system and calls into operation each unit that is required by the program currently in operation. The control unit fetches instructions from memory and determines their type or decodes them. It then breaks each instruction into a series of simple small steps or actions. By doing this, it controls the step-by-step operation of the entire computer system.

The Arithmetic/Logic Unit

The Arithmetic/Logic Unit (ALU) is the functional unit that provides the computer with logical and computational capabilities.[3] Data are brought into the ALU by the control unit, and the ALU performs whatever arithmetic or logic operations are required to help carrying out the instructions. Arithmetic operations include adding, subtracting, multiplying, and dividing. Logic operations make a comparison and take action based on the results. For example, two numbers might be compared to

determine if they are not equal. If they are equal, processing will continue; if they are not equal, processing will stop.

Registers

A register is a storage location inside the processor. Registers in the control unit are used to keep track of the overall status of the program that is running. Control unit registers store information such as the current instruction, the location of the next instruction to be executed, and the operands of the instruction. In the ALU, registers store data items that are added, subtracted, multiplied, divided, and compared. Other registers store the results of arithmetic and logic operations.

Instruction

An instruction is made up of operations that specify the function to be performed and operands that represent the data to be operated on. For example, if an instruction is to perform the operation of adding two numbers, it must know what the two numbers are and where the two numbers are. [4] When the numbers are stored in the computer's memory, they have an address to indicate where they are, so if an operand refers to data in the computer's memory, it is called an address. The processor's job is to retrieve instructions and operands from memory and to perform each operation. Having done that, it signals memory to send it to the next instruction.

The CPU executes each instruction in a series of small steps:

1. Fetch the next instruction from memory into the instruction register.
2. Change the program counter to point to the following instruction.
3. Determine the type of instruction just fetched.
4. If the instruction uses data in memory, determine where they are.
5. Fetch the data into internal CPU registers.
6. Execute the instruction.
7. Store the results in the proper place.

Go to step 1 to begin executing the following instruction.

This sequence of steps is frequently referred to as the fetch-decode-execute cycle. It is central to the operation of all computers. This step-by-step operation is repeated over and again at awesome speed. A timer called a clock releases precisely timed electrical signals that provide a regular pulse for the processor's work. [5] The term that is used to measure the computer's speed is borrowed from the domain of electrical engineering and is called a megahertz (MHz) which means million cycles per second.

Key Words

address	地址，寻址
analogous	类似的，相似的
arithmetic	算术的
auxiliary	辅助的，补充的

awesome	惊人的，令人敬畏的
capability	性能，能力
decode	解码，译码
distinguish	区别，辨别
exponentiation	幂运算
fetch	获取，取得
fraction	小部分
initiate	开始，启发，提议，创始
instantaneously	瞬间地，即时地
instruction	指令
keyboard	键盘
mainframe	大型机
manipulation	操作，处理
microelectronic	微电子的
operand	操作数
originality	创意，创造力
retrieve	恢复
remarkable	显著的，不平常的
sequence	顺序，序列
silicon	硅
transistor	晶体管

Notes

[1] Although most CPU chips are smaller than a lens of a pair of glasses, the electronic components they contain would have filled a room a few decades ago.

本句由“Although”引导让步状语从句，“the electronic components”作主语。

译文：虽然大多数 CPU 芯片比一块眼镜片还小，但所包含的电子元件在几十年前却要装满一个房间。

[2] The program, which tells the computers what to do and the data, which provide the information needed to solve the problem, are kept inside the computer in a place called memory.

这里的主语是“the program and the data”，由 which 引导的两个定语从句分别修饰 the program 和 the data。

译文：程序的作用是指示计算机如何工作，而数据则是为解决问题提供的所需要的信息，两者都存储在存储器里。

[3] The Arithmetic/Logic Unit (ALU) is the functional unit that provides the computer with logical and computational capabilities.

本句由“that”引导定语从句，修饰“the functional unit”。

译文：算术逻辑单元（ALU）是为计算机提供逻辑及计算能力的功能部件。

[4] For example, if an instruction is to perform the operation of adding two numbers, it must know what the two numbers are and where the two numbers are.

这里的“what the two numbers are and where the two numbers are”作宾语，它由两个并列的从句组成。

译文：例如，一条指令要完成两数相加的操作，它就必须知道：这两个数是什么？这两个数在哪儿？

[5] A timer called a clock releases precisely timed electrical signals that provide a regular pulse for the processor’s work.

本句中的“that provide a regular pulse for the processor’s work”修饰 electrical signals。

译文：一个称为“时钟”的计时器准确地发出定时电信号，该信号为处理器工作提供有规律的脉冲信号。

1.1.2 Exercises

1．Translate the following phrases into English

（1）集成电路

（2）取指—译码—执行

（3）算术逻辑运算

（4）微电子技术

（5）数字计算机系统

（6）辅助存储器

（7）工作区

（8）逻辑决策

2．Translate the following phrases into Chinese

（1）Central Processing Unit

（2）functional unit

（3）current instruction

（4）instruction register

（5）program counter

（6）electronic components

（7）input information and commands

（8）Arithmetic/Logic Unit

3．Identify the following to be True or False according to the text

（1）A computer can replace people to do all kinds of work.

（2）In the ALU, registers store data items that are added, subtracted, multiplied, divided, and compared.

（3）Registers in the control unit are used to keep track of the overall status of the program.

（4）In the ALU, registers only store the results of arithmetic and logic operations.

（5）A register is a storage location inside the processor.

（6）ALU fetched instructions from memory and determines their type.

（7）To store the results in the proper place is done by ALU.

（8）The term that is used to measure the computer’s speed is borrowed from the domain of electrical engineering.

4. Reading Comprehension

（1）A processor is composed of two functional units, they are_____.

a. an arithmetic/logic unit and a storage unit

b. a control unit and some registers

c. a control unit and an arithmetic/logic unit

d. some registers and an arithmetic/logic unit

（2）The control unit fetches _____from memory and decodes them.

a. data

b. information

c. results

d. instructions

（3）_____ is a storage location inside the processor.

a. A register

b. ALU

c. Control unit

d. Memory

（4）The CPU executes each instruction in a series of steps, the sequence is_____.

a. execute-fetch-decode

b. fetch-decode-execute

c. decode-execute-fetch

d. fetch-execute-storage

1.1.3 Reading Material

Microprocessor

Microcomputer, or micro for short, is a kind of computer. It was born in the early 1970s. The computer's brain is called the microprocessor. That's the main chip in a computer that does all the work. It's also the center of activity on the motherboard. It interprets and executes the instructions which comprise a computer program. The CPU consists of an arithmetic unit and its associated circuitry, known as the arithmetic and logic unit, and an instruction counter and decoder. The CPU can perform only one operation at a time. Essentially, numerically coded instructions are stored in the computer's high-speed storage, or primary storage. The CPU takes the instructions one at a time and executes them. The numerical coding of the instruction tells the CPU which operation to perform and where the data upon which the operation is to take place is stored.

The central processor of the micro, called the microprocessor, is built as a single semiconductor device; that is, the thousands of individual circuit elements necessary to perform all the logical and arithmetic functions of a computer are manufactured as a single chip. A complete microcomputer system is composed of a microprocessor, a memory and some peripheral equipment. The processor, memory and electronic controls for the peripheral equipment are usually put together on a single or on a few printed circuit boards. Systems using microprocessors can be hooked up together to do the

works that until recently only minicomputer systems were capable of doing. Micros generally have somewhat simpler and less flexible instruction sets than minis, and are typically much slower. Similarly, minis are available with much larger primary memory sizes. Micros are becoming more powerful and converging with minicomputer technology.

The microprocessor is essentially a small calculator. It does basic calculator like things—adding, subtracting, multiplying, and dividing values stored in the computer's memory. Computer programs tell the microprocessor what to do, which is how everything works inside a PC.

Other terms for the microprocessor include the processor, the central processing unit (CPU), and the number of the microprocessor, such as 8088, 80286, 80386,80486, and so on. (Note that although there are many numbers/names for a microprocessor, those above are the most common.)There are three main varieties of microprocessors for PCs: the 8088/8086, the 80286, or AT microprocessor , and the 386 family of microprocessor . There is no 586 microprocessor. Instead of calling it a number, the company that manufactured it(Intel)called it the Pentium. It's the micro part of microprocessor that led old-time computer users to call PCs microprocessor. This may have applied to the first microprocessor, but today's powerhouse PCs are anything but micro.

How can you tell which microprocessor your PC has? The best way is to look at the label, which probably has a microprocessor number in it: 386 and 486 are common. And, as a last resort, you can use PC diagnostic software to figure out which microprocessor you have. The latest offspring in the 386 families are the Pentium computers, which would have been called 586 computers. The Pentium is basically a fast, all-powerful 386. About a year after the first Pentium microprocessor came out, a small problem was discovered, the Pentium had a problem doing math. Specifically, a division problem, when two particular numbers were divided, the Pentium produced a result that wasn't quite accurate. Intel quickly admitted to the mistake and offered replacement Pentiums. Then they fixed the problem and any new Pentiums that came rolling out of the factory were doing much better in math. Now there's nothing more to worry about.

1.2 Memory

1.2.1 Text

A memory cell is a circuit, or in some cases just a single device, that can store a bit of information. A systematic arrangement of memory cells constitutes a memory. The memory must also include peripheral circuits to address and write data into the cells as well as detect data that are stored in the cells.

Two basic types of semiconductor memory are considered. The first is the Random Access Memory (RAM), a read-write memory, in which each individual cell can be addressed at any particular time. The access time to each cell is virtually the same. Implicit in the definition of the RAM is that both the read and the write operations are permissible in each cell with also approximately the same access time.

A second class of semiconductor memory is the Read-Only Memory (ROM). The set of data in this type of memory is generally considered to be fixed, although in some designs the data can be

altered. However, the time required to write new data is considerably longer than the read access time of the memory cell. A ROM may be used, for example, to store the instructions of a system operating program.

A volatile memory is one that loses its data when power is removed from the circuit, while nonvolatile memory retains its data even when power is removed. In general, a Random Access Memory is a volatile memory, while Read-Only Memories are nonvolatile.

Two type of RAM are the static RAM (SRAM) and dynamic RAM (DRAM). A static RAM consists of a basic bi-stable flip-flop circuit that needs only a dc current or voltage applied to retain its memory. Two stable states exist, defined as logic 1 and logic 0. A dynamic RAM is an MOS memory that stores one bit of information as charge on a capacitor. Since the charge on the capacitor decays with a finite time constant (milliseconds), a periodic refresh is needed to restore the charge so that the dynamic RAM does not lose its memory.

The advantage of the SRAM is that this circuit does not need the additional complexity of a refresh cycle and refresh circuitry, but the disadvantage is that this circuit is fairly large. In general, a SRAM requires six transistors. The advantage of a DRAM is that it consists only one transistor and one capacitor, but the disadvantage is the required refresh circuitry and refresh cycles.

There are two general types of ROM. The first is programmed either by the manufacturer (mask programmable) or by the user (programmable, or PROM). Once the ROM has been programmed by either method, the data in the memory are fixed and cannot be altered. The second type of ROM may be referred to as an alterable ROM in that the data in the ROM may be reprogrammed if desired. This type of ROM may be called an EPROM (erasable programmable ROM), EEPROM (electrically erasable PROM), or flash memory. As mentioned, the data in these memories can be reprogrammed although the time involved is much longer than the read access time. In some cases, the memory chip may actually have to be removed from the circuit during the reprogramming process.

The basic memory architecture has the configuration shown in Fig. 1-2. The terminal connections may include inputs, outputs, addresses, and read and write controls. The main potion of the memory involves the data storage. A RAM memory will have all of the terminal connections mentioned, whereas a ROM memory will not have the inputs and the write controls.

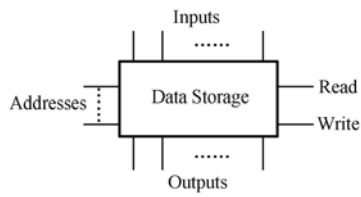

Fig. 1-2 Basic memory architecture

Computer memory is measured in kilobytes or megabytes of information. A byte is the amount of storage needed to hold one character, such as a letter or a numeric digit. One kilobyte (KB) equals 1024 bytes, and one megabyte (MB) is about 1 million bytes. Software requires the correct amount of RAM to work properly. If you want to add new software to your computer, you can usually find the exact memory requirements on the software packaging.

Memories consist of a number of cells, each of which can store a piece of information. Each cell has a number, called its address, by which programs can refer to it. If a memory has *n* cells, they will have addresses from 0 to *n*–1. All cells in a memory contain the same number of bits. If a cell consists of k bits, it can hold any one of 2^k different bit combinations. Note that adjacent cells have consecutive addresses.

Computers that use the binary number system（including octal and hexadecimal notation for binary numbers）also express memory addresses as binary numbers. If an address has *m* bits, the maximum number of cells directly addressable is 2^m. The number of bits in the address is related to the maximum number of directly addressable cells in the memory and is independent of the number of bits per cell. [1] A memory with 2^{12} cells of 8 bits each and a memory with 2^{12} cells of 64 bits each would each need 12-bit addresses.

The significance of the cell is that it is the smallest addressable unit. In recent years, most computer manufactures have standardized on an 8-bit cell, which is called a byte. Bytes are grouped into words. A computer with a 16-bit word has 2 bytes/word, whereas a computer with a 32-bit word has 4 bytes/word. The significance of a word is that most instructions operate on entire words, for example, adding two words together. Thus, a 32-bit machine will have 32-bit registers and instructions for moving, adding, subtracting, and otherwise manipulating 32-bit words. [2]

In the 1970s, there was a further development which revolutionized the computer field. This was the ability to etch thousands of integrated circuits onto a tiny piece (chip) of silicon, which is a non-metallic element with semiconductor characteristics. [3] Chips have thousands of identical circuits, each one capable of storing one bit. Because of the very small size of the chip, and consequently of the circuits etched on it, electrical signals do not have to travel far; hence, they are transmitted faster. Moreover, the size of the components containing the circuitry can be considerably reduced, a step which has led to the introduction of both minis and micros. As a result, computers have become smaller, faster, and cheaper. There is one problem with semiconductor memory, however, when power is removed, information in the memory is lost, unlike core memory, which is capable of retaining information during a power failure.

The 80x86 processors, operating in real mode, have physical address-ability to 1 megabyte of memory. EMS was developed to allow real mode processing to have access to additional memory. It uses a technique called paging, or bank switching. The requirements for expanded memory include additional hardware and a software device driver. The bank switching registers act as gateways between the physical window within the 1 megabyte space and the logical memory that resides on the expanded memory board. The device driver, called the Expanded Memory Manager (EMM), controls the registers so that a program’s memory accesses can be redirected throughout the entire of available expanded memory.

To access expanded memory, a program needs to communicate with the EMM.[4] Communication with the EMM is similar to making calls to DOS. The program sets up the proper CPU registers and makes a software interrupt request. More than 30 major functions are defined, and applications and operating systems are given control over expanded memory. When a program allocates expanded memory pages, the EMM returns a handle to the requesting program. [5] This

handle is then used in future calls the EMM to identify which block of logical pages is being manipulated.

Key Words

adjacent	邻近的，接近的
allocate	分配，分派
capacitor	电容
configuration	结构
consecutive	连续的，连贯的
etch	蚀刻
hexadecimal	十六进制的
implicit	暗示的，绝对的
individual	个别的，独特的
kilobyte	千字节
megabyte	兆字节
millisecond	毫秒
non-metallic	非金属的
nonvolatile	非易失性的
octal	八进制的
organization	组织
programmable	可编程的
semiconductor	半导体
significance	重要性，意义
stable	稳定的
standardize	标准化
virtually	事实上

Notes

[1] The number of bits in the address is related to the maximum number of directly addressable cells in the memory and is independent of the number of bits per cell.

本句中，of directly addressable cells in the memory 修饰 the maximum number。

译文：地址的位数与存储器可直接寻址的最大单元数量有关，而与每个单元的位数无关。

[2] Thus a 16-bit words, whereas a 32-bit machine will have 32-bit registers and instructions for moving, adding, subtracting, and otherwise manipulating 32-bit words.

Thus a 16-bit words 是一个省略句，这里的 whereas 作“而”讲。

译文：因而 16 位机器具有 16 位的寄存器和指令以实现 16 位字的操作；32 位机器则有 32 位的寄存器和指令，以实现传送、加法、减法和其他 32 位字的操作。

[3] This was the ability to etch thousands of integrated circuits onto a tiny piece (chip) of silicon, which is a non-metallic element with semiconductor characteristics.

由 which 引导的是非限定性定语从句，用来修饰 silicon。

译文：这就是将成千上万个集成电路蚀刻在一小块硅（芯）片上的能力。硅片是具有半导体特性的非金属元件。

[4] To access expanded memory, a program needs to communicate with the EMM.

本句中的“to access expanded memory”作目的状语。

译文：为了访问扩展存储器，程序需要与 EMM 联系。

[5] When a program allocates expanded memory pages, the EMM returns a handle to the requesting program.

本句中，由“when”引导时间状语从句。

译文：当一个程序装入扩展存储器中时，EMM 就将一个标志回复给这个请求程序。

1.2.2 Exercises

1．Translate the following phrases into English

（1）易失性存储器

（2）外围电路

（3）实模式

（4）寻址能力

（5）闪存

（6）刷新电路

（7）只读存储器

（8）随机存取存储器

2．Translate the following phrases into Chinese

（1）periodic refresh

（2）software interrupt

（3）binary number

（4）electrically erasable PROM

（5）expanded memory

（6）erasable programmable ROM

（7）refresh cycle

（8）logical page

3．Identify the following to be True or False according to the text

（1）Both static and dynamic RAM cells are read-write memory.

（2）Nonvolatile memory loses its data when power is removed from the circuit.

（3）ROM does not have the inputs and the write controls.

（4）The memory addresses are expressed as binary numbers.

（5）EMS allows the real mode processing to access 1MB memory.

（6）RAM can be used to store the instructions of a system program.

（7）A byte is the amount of storage needed to hold one character.

（8）Communication with the EMM is similar to making calls to DOS.

4．Reading Comprehension

（1）One megabyte equals approximately _____.

a．1 000 000 bytes
b．10 24 bytes
c．65 535 bytes
d．10 000 bytes

（2）If a cell consist of *n* bits, it can hold any one of _____.
a．2*n* different bit combinations
b．2^{n-1} different bit combinations
c．2^{n} different bit combinations
d．*n* different bit combinations

（3）When power is removed, information in the semiconductor memory is _____.
a．reliable
b．lost
c．manipulated
d．remain

（4）A periodic refresh is needed to restore the information for the _____.
a．SRAM
b．EPROM
c．DRAM
d．EEPROM

1.2.3 Reading material

Cache and Magnetic Disks

A variety of different types of cache (disk cache, memory cache, processor cache) can improve overall system performance. Although most high-level systems include cache in system design, a cache can be optionally implemented on almost any system—from a low-level 8086 system upon to the highest performance i486-based system.

In the case of hard disk cache, there are two general approaches to cache implementation. The two approaches primarily differ in terms of where the memory in the cache resides. The first and most commonly implemented form of disk cache uses extended memory. In a microcomputer, the extended memory of 1 megabyte or larger can be assigned as disk cache memory. The higher the percentage of “hits” (calls to the disk that can be read from cache, rather than from the disk), the greater the overall performance of the system. For word processing or manipulation of small files, a huge cache may be overkill. For manipulation of large database files of complex graphics, a cache using extended memory can provide a significant performance increase. The second form of disk cache is performed by cache controllers. These controllers not only control the read/write operations of the attached hard disk drives, they also provide a cache that performs many of the functions of the system-based extended memory caches. However, by placing the cache on the controller, performance of a cache can be enhanced over that of most extended memory caches.

High-speed memory is used on cache controllers. When the system makes a call to the hard

disk, the controller in cache determines whether or not the data that's being called for is in the cache or on the disk. When using an extended memory cache, the cache intercepts calls for reads from the hard disk and checks to see if the data called for by the system resides in the cache. If the data is not in the cache, a read instruction is sent to the disk controller. This process takes time. Not only is the extended memory used for such caches usually slower than that used in cache controllers,but also an extra step is involved before the disk controller can be instructed to go to the disk to retrieve the data it seeks. However, by allowing the processor to make calls to the cache controller, which then determines whether or not the disk actually must be read, performance can be significantly enhanced. With intelligent cache controllers, significant performance improvements have been claimed by a number of cache controller manufacturers. Cache controllers have been used on mainframe computer systems for many years; their migration to the micro could be seen as a logical next step.

There are two major types of magnetic disks: floppy disks and hard disks. Both types of disks rely on a rotating platter coated with a magnetic surface and use a moveable read/write head to access the disk. Disk storage is nonvolatile, meaning that the data remains even when power is removed. Because the platters in a hard disk are metal (or, recently, glass), they have several significant advantages over floppy disks.

Every user has used hard disks and liked them very much since they have gigantic storage capacity and work fast, especially since operating systems grow larger and larger. One example is Windows98, with its full installation needing 300MB memory, long application programs and multimedia development need more and more storage space, etc. All of these spur the development of hard disks. The hard disk storage capacity almost is doubled every year and the hard disk works faster and faster. The rotative velocity of a main shaft of a motor in a hard disk is working speed of the hard disk. The velocities is now commonly from 5400rpm to 7200rpm. The high turning velocity can reduce average seek times and waiting times. Most of average seek times are less 10ms. The hard disk capacity develops very fast, it is almost doubled every year. The larger the capacity, the lower the cost of storage per bit. You should select a suitable one according to your economic ability and experience.

To access data, the operating system must direct the disk through a three-stage process. The first step is to position the arm over the proper track. This operation is called a seek, and the time to move the arm to the desired track is called seek time. Once the head has reached the correct track, we must wait for the desired sector to rotate under the read/write head. This time is called the rotation latency or rotational delay. The average latency to the desired information is halfway around the disk. Smaller diameter disks are attractive because they can spin at higher rates without excessive power consumption, thereby reducing rotational latency. The last component of a disk access, transfer time, is the time to transfer a block of bits, typically a sector. This is a function of the transfer size, the rotation speed, and the recording density of a track.

1.3 Input/Output Systems

1.3.1 Text

Keyboard

If you are familiar with a typewriter, you'll find the layout of the computer keyboard very similar. You can use your keyboard for many purposes:

- Typing information
- Entering numbers with the numeric keypad
- Requesting specific functions
- Performing system functions with key combinations
- Moving around the computer screen

The keyboard has letter keys, punctuation keys, and a spacebar. It also has functions, numeric, and arrow keys. How you use the keys depends on the software installed on your computer. The documentation that comes with your software has information about specific key functions. You will probably notice a difference between the touch (response) on a computer keyboard and the response of a typewriter. A computer keyboard is so responsive that you can type using a light touch. When you hold down a character key, the character continues to type. This is called the typematic effect of a computer keyboard.

Monitor

Monitors maybe are one of the most important output devices. Computers only use monitors to show you exciting operation results or marvelous and vivid pictures. Monitors also are the best windows for conversation between users and computers. So, many users select monitors carefully. Which parameters or indexes ought be paid attention to when you select a monitor? We provide some here for your reference.

Element Distance: The distance between two picture elements in horizontal direction is called element distance here and its current value in most PC monitors is 0.28mm. If the value is smaller, the screen is more distinct.

Video Bandwidth: It is an important concept in monitor technology. It is related to the highest work frequency of the monitor. It is from tens MHz to hundreds MHz.

Solution: It is another important parameter of a monitor. It's higher, the view on a screen is clearer. Solution means the sum of all picture elements on a screen.

Scan Style: The scan style of a electron gun in a tube is divided into two styles: interlace and non-interlace. In interlace style, electron-beam sweeps elements in odd rows first time and does elements in even rows second time. [1] A frame to be renewed needs sweeping two times. In non-interlace style, electron-beam sweeps all elements only in one time. In non-interlace work style, the monitor works better and gives clear pictures without flash.

Mouse

The interface between a mouse and a system can take one of two forms: the mouse either generates a series of pulses when it is moved (using the LED and detector to generate the pulses), or it increments and decrements counters. The processor can periodically read these counters, or count up the pulses, and determine how far the mouse has moved since it was last examined. The system then moves the cursor on the screen appropriately. This motion appears smooth because the rate at which you can move the mouse is slow compared with the rate at which the processor can read the mouse status and move the cursor on the screen.

Most mice also include one or more buttons, and the system must be able to detect when a button is depressed. By monitoring the status of the button, the system can also differentiate between clicking the button and holding it down. [2] Of course, the mapping between the counters and the button position and what happens on the screen is totally controlled by software. That's why, for example, the rate at which the mouse moves across the screen and the rate at which single and double clicks are recognized can usually be set by the user. Similarly, software interpretation of the mouse position means that the cursor doesn't jump completely off the screen when the mouse is moved a long distance in one direction. [3]

Optical Disks

An optical disk is a disk on which data are encoded for retrieval by a laser. Optical disks offer information densities far beyond the range of current magnetic mass-storage devices. Similar devices have been on the market for several years in the form of laser videodisks and audio compact disks (CDs) for consumer use. These laser videodisks are analog, that is, the disk contains one spiral track, like the track on a phonograph record. Optical disks for computer applications are digital and store their information on concentric tracks, like their magnetic cousins. Currently, three versions of optical disk technology are competing for the mass-storage market, they are read-only optical disks, write-once optical disks, and erasable optical disks.

Unlike conventional magnetic disks, read-only optical disks cannot be written on and so have the functional equivalence of read-only memory. The most popular version of read-only optical disks employs the same technology as the CD that has become popular for audio recording. The technology is digital and based on a 4 3/4 inch optical disk that can store 540MB on a single side. The devices are called Compact Disk Read-Only Memories (CD-ROM).

Write-once optical disks (also called write-once, read-mostly, or WORM) are blank disks that are recorded on by the user. To write data, a powerful beam of laser light burns tiny spots or pits into the coating that covers the surface of these disks.[4] Once burnt in, the spots are not erasable. To retrieve the data, a less powerful laser is used to read the pattern of spots and convert the patterns into audiovisual signals that can be played back on a television set. Write-once optical disks are being used to replace microfilm storage. Because optical disks have the ability to store images as well as sound, their use is quite versatile. Anything that can be digitized, such as documents, pictures, photographs, line drawings, and music, can be recorded and stored on an optical disk.

Erasable optical disks use lasers to read and write information to and from the disk but also use

a magnetic material on the surface of the disk and a magnetic write head to achieve erasability. To write on such as disk, a laser beam heats a tiny spot on it; then a magnetic field is applied to reverse the magnetic polarity of the spot. Erasable optical disk systems offer the same storage capabilities of the non-erasable optical disks, along with the same reusability capabilities of conventional magnetic disks, such as Winchester systems.

Bus

A bus is a shared communication link, which uses one set of wires to connect multiple subsystems. The two major advantages of the bus organization are versatility and low cost. By defining a single connection scheme, new devices can easily be added, and peripherals can even be moved between computer systems that use the same kind of bus. Furthermore, buses are cost effective, because a single set of wires is shared in multiple ways. The major disadvantage of a bus is that it creates a communication bottleneck, possibly limiting the maximum I/O throughput. When I/O must pass through a single bus, the bandwidth of that bus limits the maximum I/O throughput.

One reason bus design is so difficult is that the maximum bus speed is largely limited by physical factors: the length of the bus and the number of devices.[5] These physical limits prevent us from running the bus arbitrarily fast. Within these limits, there are a variety of techniques we can use to increase the performance of the bus; however, these techniques may adversely affect other performance metrics. For example, to obtain fast response time for I/O operations, we must minimize the bus latency by streamlining the communication path. On the other hand, to sustain high I/O data rates, we must maximize the bus bandwidth. The bus bandwidth can be increased by using more buffering and by communicating larger blocks of data, both of which increase the bus latency! Clearly, these two goals, low latency and high bandwidth can lead to conflicting design requirements. Finally, the need to support a range of devices with widely varying latencies and data transfer rates also makes bus design challenging.

A bus generally contains a set of control lines and a set of data lines. The control lines are used to signal requests and acknowledgments, and to indicate what type of information is on the data lines. The data lines of the bus carry information between the source and the destination. This information may consist of data, complex commands, or addresses. For example, if a disk wants to write some data into memory from a disk sector, the data lines will be used to indicate the address in memory in which to place the data as well as to carry the actual data from the disk. The control lines will be used to indicate what type of information is contained on the data lines of the bus at each point in the transfer. Some buses have two sets of signal lines to separately communicate both data and address in a single bus transmission. In either case, the control lines are used to indicate what the bus contains and to implement the bus protocol.

Key Words

acknowledgement	承认，确认
appropriately	适当地
bandwidth	带宽

blank	空白的
cursor	光标
documentation	文档，文件
interface	接口，界面
latency	潜伏，潜在
layout	布局，分布
marvelous	令人惊异的，了不起的
minimize	最小化
mouse	鼠标
non-interlace	非隔行
optical	光学的
parameter	参数
periodically	定期地
punctuation	标点符号
responsive	响应，应答的
reusability	可重复使用的
solution	分辨率
spacebar	空格键
streamline	流线，流线型
subsystem	子系统
sustain	承受，支持
typewriter	打字机
video	视频

Notes

[1] In interlace style, electron-beam sweeps elements in odd rows first time and does elements in even rows second time.

本句中的 electron-beam 译做电子束，elements 译做像素。

译文：在隔行方式中，电子束首先扫描奇数项中的像素，第二次再扫描偶数项中的像素。

[2] By monitoring the status of the button, the system can also differentiate between clicking the button and holding it down.

本句中的“By monitoring the status of the button”是分词短语作状语。

译文：依靠对按钮状态的监测，系统也就能区分单击按键与拖曳之间的差别。

[3] Similarly, software interpretation of the mouse position means that the cursor doesn’t jump completely off the screen when the mouse is moved a long distance in one direction.

本句中，“when”引导时间状语从句。

译文：同样，用软件描述鼠标位置，也意味着当鼠标沿一个方向长距离移动时，光标不会完全跳离出屏幕。

[4] To write data, a powerful beam of laser light burns tiny spots or pits into the coating that covers the surface of these disks.

本句中的“To write data”作目的状语，“that covers the surface of these disks”是定语从句，修饰“the coating”。

译文：为了写入数据，激光的强大光束将覆盖在光盘的表层并烧结出小斑点或凹点。

[5] One reason bus design is so difficult is that the maximum bus speed is largely limited by physical factors: the length of the bus and the number of devices.

本句中的“bus design is so difficult”是定语，修饰“reason”，“that the maximum bus…”是表语从句。

译文：总线设计如此困难的一个原因是，总线的速度很大程度上受物理因素限制：总线长度和设备数量。

1.3.2 Exercises

1．Translate the following phrases into English

（1）通信瓶颈

（2）总线协议

（3）像素距离

（4）只读光盘

（5）电子枪

（6）输出设备

（7）水平方向

（8）总线带宽

2．Translate the following phrases into Chinese

（1）numeric keypad

（2）electron-beam

（3）typematic effect

（4）scan style

（5）data transfer rate

（6）source and the destination

（7）magnetic polarity

（8）disk sector

3．Identify the following to be True or False according to the text

（1）The two major advantages of the bus organization are versatility and low cost.

（2）The mouse can use LED to generate pulses.

（3）Keyboard, mouse and monitor are all input devices.

（4）The bandwidth of a bus may limit the minimum I/O throughput.

（5）A monitor is the best window for conversation between users and a computer.

（6）Peripherals can be moved between computer systems that use the same kind of bus.

（7）When we design a bus, we do not need to consider the bus speed.

（8）A bus generally contains a set of control lines and data lines.

4．Reading Comprehension

（1）Which is wrong in below four items? _____

a. The keyboard has letter keys and punctuation keys.

b. The keyboard has spacebar and punctuation keys.

c. The keyboard has function keys and numeric keys.

d. The keyboard has not arrow keys.

（2）_____ is the distance between two picture elements in horizontal direction.

a. Element Distance

b. Scan Style

c. Solution

d. Vertical Scan Rate

（3）The _____ is used to implement the bus protocol.

a. data bus

b. control bus

c. address bus

d. signal bus

（4）Video Bandwidth is related to the highest work frequency of the monitor. It is from_____.

a. five MHz to hundreds MHz

b. tens MHz to twenty MHz

c. tens MHz to hundreds MHz

d. tens MHz to thousands MHz

1.3.3 Reading material

How MP3 Files Work

The MP3 format is a compression system for music. The MP3 format helps reduce the number of bytes in a song without hurting the quality of the song's sound. The goal of the MP3 format is to compress a CD-quality song by a factor of 10 to 14 without noticeably affecting the CD-quality sound. With MP3, a 32-megabyte song on a CD compresses down to about 3MB. This lets you download a song in minutes rather than hours, and store hundreds of songs on your computer's hard disk without taking up that much space.

Is it possible to compress a song without hurting its quality? We use compression algorithms for images all the time. For example, a GIF file is a compressed image. So is a JPG file. We create Zip files to compress text. So we are familiar with compression algorithms for images and words and we know they work. To make a good compression algorithm for sound, a technique called perceptual noise shaping is used. It is "perceptual" partly because the MP3 format uses characteristics of the human ear to design the compression algorithm. For example:

- There are certain sounds that the human ear cannot hear.
- There are certain sounds that the human ear can hear much better than others.
- If there are two sounds playing simultaneously, we can hear the louder one but cannot hear the softer one.

Using facts like these, certain parts of a song can be eliminated without significantly hurting the quality of the song for the listener. Compressing the rest of the song with well-known compression techniques shrinks the song considerably—by a factor of 10 at least. When you are done creating an MP3 file, what you have is a “near CD quality” song. The MP3 version of the song does not sound exactly the same as the original CD song because some of it has been removed, but it’s very close.

From this description, you can see that MP3 is nothing magical. It is simply a file format that compresses a song into a smaller size so it is easier to move around on the Internet and store.

There are literally thousands of sites on the Web where you can download MP3 files. Go to one of these sites, find a song and download it to your hard disk. Most songs range between 2 and 4MB, so it will take 10 to 15 minutes unless you have a high-speed Internet connection. Once the song has finished downloading, try to double-click on the file and see what happens. If your computer plays it, then you are set.

If you find that you cannot play it，then you need to download an MP3 player. There are dozens of players available, and most of them are free or shareware. One of the most popular is WinAmp, which you can download from www.winamp.com.

You are now ready to begin collecting MP3 files and saving them on your computer. Many people who start collecting MP3 files find that they want to listen to them in all kinds of places. Small, portable MP3 players answer this need. These players plug into your computer’s parallel, FireWire or USB port to transfer the data, and a software application lets you transfer your MP3s into the player by simply dragging the files.

If you have a CD collection and would like to convert songs from your CDs into MP3 files, you can use ripper and encoder software to do just that. A ripper copies the song’s file from the CD onto your hard disk. The encoder compresses the song into the MP3 format. By encoding songs, you can play them on your computer or take them with you on your MP3 player.

You can write the MP3 files themselves onto a data CD in order to save them and clear some space on your hard disk. You can then listen to the files on any computer. Some car stereos and DVD players now let you play data-encoded MP3s, too.

If you are an artist who is recording music at home or in small studio, you can use MP3 files and the Web to distribute your music to an extremely large audience. The first step is to create a song, either on a cassette tape, minidisk or CD. If it is on a CD, you can use the ripper and encoder tools described in the previous section to create an MP3 file. If it is on a cassette, you can connect the output of your cassette deck to the line-in or microphone jack of your sound card and record the music digitally on your computer. Then you can encode that file to create the MP3.

Unit 2 Software Knowledge

2.1 C Language

2.1.1 Text

C is a general-purpose, structured programming language. Its instructions consist of terms that resemble algebraic expressions, augmented by certain English keywords such as if, else, for, do and while. In this respect C resembles other high-level structured programming languages. C also contains certain additional features however, that allow it to be used at a lower level, thus bridging the gap between machine language and the more conventional high-level languages. This flexibility allows C to be used for systems programming (e.g., for writing operating systems) as well as for applications programming (e.g., for writing a program to solve a complicated system of mathematical equations, or for writing a program to bill customers).

C was developed in the early 1970s. C might best be described as a “medium-level language.” Like a true high-level language, there is a one-to-many relationship between a C statement and the machine language instructions it is complied into. Thus, a language like C gives you far more programming leverage than a low-level assembly language. However, compared to most high-level language, C has a very small set of constructs.[1] In addition, unlike most high-level language, C lets you easily do chores (such as bit and pointer manipulation) additionally performed by assembly language.

Structured language

Although the term block-structured language does not strictly apply to C in an academic sense, C is informally part of that language group. The distinguishing feature of block-structured language is that the compartmentalization of code and data. This means that a language can section off and hide from the rest of the program all information and instructions that are necessary to perform a specific task. Generally, compartmentalization is achieved by subroutines with local, or temporary, variables. In this way, you can write subroutines so that the events that occur within them will cause no side effects in other parts of the program. Excessive use of global variables, which are known throughout the entire program, may allow bugs, or unwanted side effects, to creep into a program. In C, all subroutines are discrete functions.

Functions are the building blocks of C, in which all program activity occurs. They allow you to define and code specific tasks in a program separately. After debugging a function that uses only local variables, you can rely on it to work properly in various situations without creating side effects in other parts of your program. All variables that are declared in that function will be known only to that function.

A C program consists of a series of functions. Program execution must begin with a function called main ( ). Other functions included in the program are named by the programmer. When the name of a function appears as a statement in a program, program execution transfers to that function. After the called function has been completely executed, a result is made to the calling function. If one function calls another function, the second function is said to be nested inside the first. In many cases, when a function is called, information is passed to it. This information is included within the parentheses after the function name. The called function may also return a single value to the calling function.

Declarations and Definitions

The difference between a declaration and a definition in C is subtle but important. A declaration associates a data type with an identifier but does not actually allocate any storage for it. A definition, on the other hand, actually allocates memory. The distinction between declarations and definitions is particularly important when creating global variables.

A “global variable” (also called an “external variable”) is one that can be accessed by modules in different source files; that is, a global variable has global scope. There are three ways that you create a global variable:

- Create a variable at the top-level with the extern storage class specifier. This produces a variable declaration. Such a declaration cannot contain an initializer. You can access this global variable throughout the remainder of the file.
- Create a variable at the head-of block with the extern storage class specifier. This produces a variable declaration. Such a declaration cannot contain an initializer. You can access this variable only within the block in which you declare it.
- Create a variable at the top-level and omit a storage class specifier. This produces a variable definition. Such a definition can contain an optional initializer.

In C language, every global variable can be declared zero or more times (in different files), but must be defined at least once, and may be defined more than once in different files. You cannot, however, define a global variable more than once in the same file. If you explicitly initialize a global variable in more than one file, the last initializer read by the binder is the variable’s initial value at runtime. Therefore, the order in which you list files in the bind command determines the initial values of external variables. If you do not initialize a global definition, its initial value defaults to zero.

The duration of a variable is the period of time during which storage is allocated to the variable. There are two categories of duration: dynamic and fixed. A variable with dynamic duration is created anew each time the block in which it is declared is entered.[2] When the program leaves the block, the variable disappears. Conversely, a variable with fixed duration exists throughout the execution of the entire program.

We can summarize the differents between fixed and dynamic variables as follows:

- Fixed variables maintain their values from one block invocation to another, but dynamic variables lose their value each time the block is deactivated.

- Fixed variables get a default initialization value of zero if you do not explicitly initialize them. However, if you do not explicitly initialize a dynamic variable, the compiler will not initialize it for you.
- The run-time system initializes fixed variables only once, whereas dynamic variables, if they are declared with an initializer, are re-initialized each time their block is entered.[3]

The scope of a variable is the region in source code over which the variable is active. If a variable is active, it means that you can use it in your source code. If a variable is not active, and you attempt to use it in your source code, the compiler issues an error.

There are four types of scope: block, function, file, and program. Block scope means that the variable is active from its declaration point to the end of the block in which it is declared. Function scope means that the variable is active from its declaration point to the end of the function. File scope means that variable is active from its declaration point to the end of the file. Global scope means that the variable is active for the entire program (including all the files of source code that comprise the program).

Characteristics

C is characterized by the ability to write very concise source programs, due in part to the large number of operators included within the language. It has a relatively small instruction set, though actual implementations include extensive library functions which enhance the basic instructions. Furthermore, the language encourages users to write additional library functions of their own. Thus, the features and capabilities of C language can easily be extended by the user.

C compilers are commonly available for computers of all sizes, and C interpreters are becoming increasingly common.[4] The compilers are usually compact, and they generate object programs that are small and highly efficient when compared with programs compiled from other high-level languages, the interpreters are less efficient, though they are easier to use when developing a new program. Many programmers begin with an interpreter, and then switch to a compiler once the program has been debugged (once all of the programming errors have been removed).

Another important characteristic of C is that its programs are highly portable, even more so than with other high-level languages. The reason for this is that C relegates most computer-dependent features to its library functions. Thus, every version of C is accompanied by its own set of library functions, which are written for the particular characteristics of the host computer.[5] These library functions are relatively standardized, however, and each individual library function is generally accessed in the same manner from one version of C to another. Therefore, most C programs can be processed on many different computers with little or no alteration.

Key Words

academic	学术的
activity	活动，活跃
category	种类，类项
compartmentalization	划分，分门别类

compiler	编译器
conventional	传统的，习惯的
creep	蔓延，爬行
debug	调试
declaration	声明
definition	定义
duration	持续时间，持续
flexibility	灵活性，适应性
identifier	标识符
interpreter	解释器
leverage	杠杆作用
parentheses	括号
pointer	指针
statement	语句
subroutine	子程序
subtle	微小的

Notes

[1] However, compared to most high-level language, C has a very small set of constructs.

本句中的 “compared to”的含义是“将……与……比较”。

译文：与大多数高级语言相比，C 语言有一个小的结构集。

[2] A variable with dynamic duration is created anew each time the block in which it is declared is entered.

本句中的“in which it is declared”是定语从句，修饰和限定“the block”。而“each time the block in which it is declared is entered”是一个时间状语从句，修饰“is created”。

译文：每当程序进入变量说明块时，一个动态持续变量就会重新建立。

[3] The run-time system initializes fixed variables only once, whereas dynamic variables, if they are declared with an initializer, are re-initialized each time their block is entered.

本句中 if 引导了一个条件状语从句。“whereas”是一连词，含义是“反之；而”。

译文：实时系统只初始化一次固定变量，而对于动态变量，若用初始化程序说明，则每当进入动态变量块时，就重新初始化。

[4] C compilers are commonly available for computers of all sizes, and C interpreters are becoming increasingly common.

本句是一个并列句，“C compilers”和“C interpreters”是主语。

译文：C 语言的编译程序普遍适用于各种容量的计算机，并且 C 语言的解释程序正变得越来越普通。

[5] Thus, every version of C is accompanied by its own set of library functions, which are written for the particular characteristics of the host computer.

本句中的“which are written for…”作为非限定性定语从句，修饰“library functions”。

译文：因此，每个版本的 C 语言都伴有它自己的库函数集，这些库函数集是按主机的特

点而编写的。

2.1.2 Exercises

1．Translate the following phrases into English

（1）高级语言

（2）源代码

（3）动态变量

（4）顶层

（5）全局变量

（6）一对多

（7）数学公式

（8）库函数

2．Translate the following phrases into Chinese

（1）structured programming language

（2）machine language

（3）local variable

（4）external variable

（5）a called function

（6）a calling function

（7）run-time system

（8）assembly language

3．Identify the following to be True or False according to the text

（1）There is a one-to-one relationship between a C statement and a machine language instruction.

（2）A C program must begin with a function called main ( ).

（3）In C language, the called function may return a single value to the calling function.

（4）There is no difference between a declaration and a definition in C language.

（5）In C language, every global variable can only be declared one time.

（6）The duration of a variable is the period of time during which storage is allocated to the variable.

（7）The scope of a variable is the region in source code over which the variable is active.

（8）Most C programs can be processed on many different computers with little or no alteration.

4．Reading Comprehension

（1）_____ maintain their values from one block invocation to another.

a．Local variables

b．Variables

c．Dynamic variables

d．Fixed variables

（2）If a variable is active, it means that you can use it in your _____.

a．source code

b. object code
c. compiler
d. interpreter

（3）C was developed in the early _____.

a. 1970s
b. 1950s
c. 1980s
d. 1860s

（4）After the called function has been completely executed, a result is made to the _____.

a. called function
b. main function
c. function
d. calling function

2.1.3 Reading Material

Programming Languages

A Little Terminology

Computer program—A computer program is a set of instructions that tells a computer exactly what to do. The instructions might tell the computer to add up a set of numbers, or compare two numbers and make a decision based on the result, or whatever. But a computer program is simply a set of instructions for the computer. The computer follows your instructions exactly and in the process does something useful—like balancing a checkbook or displaying a game on the screen or implementing a word processor.

Programming language—In order for a computer to recognize the instructions you give it, those instructions need to be written in a language the computer understands—a programming language. There are many computer programming languages—Fortran, Cobol, Basic, Pascal, C, C++, Java, Perl—just like there are many spoken languages. They all express approximately the same concepts in different ways.

Compiler—A compiler translates a computer program written in a human-readable computer language into a form that a computer can execute. You have probably seen EXE files on your computer. These EXE files are the output of compilers. They contain machine-readable programs translated from human-readable programs.

Procedural programming—Procedural programming involves using your knowledge of a programming language to create computer memory locations that can hold values and writing a series of steps or operations that manipulate those values. The computer memory locations are called variables because they hold values that might vary. For convenience, the individual operations used in a computer program often are grouped into logical units called procedures. A procedural program

defines the variable memory locations and then calls or invokes a series of procedures to input, manipulate, and output the values stored in those locations. A single procedural program often contains hundreds of variable and thousands of procedure calls.

Object-oriented programming—Object-oriented programming is an extension of procedural programming in which you take a slightly different approach to writing computer programs. Thinking in an object-oriented manner involves envisioning program components as objects that are similar to concrete objects in the real world. Then you manipulate the objects to achieve a desired result. Writing object-oriented programs involves both creating objects and creating applications that use those objects.

Machine language and assembly language

Computer programs that can be run by a computer's operating system are called executables. An executable program is a sequence of extremely simple instructions known as machine code. These instructions are specific to the individual computer's CPU and associated hardware. Machine code instructions are few in number (depending on the computer and the CPU). Typical instructions are for copying data from a memory location or for adding the contents of two memory locations (usually registers in the CPU). Machine code instructions are binary—that is, sequences of bits (0s and 1s).

Assembly language uses commands that are easier for programmers to understand than machine-language commands. Each machine language instruction has an equivalent command in assembly language. For example, in assembly language, the statement "MOV A, B" instructs the computer to copy data from one location to another. The same instruction in machine code is a string of 16 0s and 1s. Once an assembly-language program is written, it is converted to a machine-language program by another program called an assembler. Assembly language is fast and powerful because of its correspondence with machine language. It is still difficult to use, however, because assembly-language instructions are a series of abstract codes. In addition, different CPUs use different machine languages and therefore require different assembly languages. Assembly language is sometimes inserted into a high-level language program to carry out specific hardware tasks or to speed up a high-level program.

High-Level Languages

A high-level programming language is a means of writing down, in formal terms, the steps that must be performed to process a given set of data in a uniquely defined way. It may bear no relation to any given computer but does assume that a computer is going to be used. The high-level languages are often oriented toward a particular class of processing problems. For example, a number of languages have been designed to process problems of a scientific—mathematic nature, and other languages have appeared that emphasize file processing applications.

Object-oriented programming (OOP) languages like C++ are based on traditional high-level languages, but they enable a programmer to think in terms of collections of cooperating objects instead of lists of commands. Classes of objects can inherit features from other classes of objects.

For example, a class defining squares can inherit features such as right angles from a class defining rectangles. This set of programming classes simplifies the programmer's task, resulting in more reliable and efficient programs. Software reliability can be improved by object-oriented programming. Since the objects are repeatedly tested in a variety of applications, bugs are more likely to be found and corrected. Object-oriented programming also has potential benefits in parallel processing. Execution speed under object oriented methods will improve with parallel processing.

2.2 Data Structure

2.2.1 Text

A data structure is a data type whose values are composed of component elements that are related by some structure.[1] It has a set of operations on its values. In addition, there may be operations that act on its component elements. Thus we see that a structured data type can have operations defined on its component values, as well as on the component elements of those values.

Data type

The essence of a data type is that it attempts to identify qualities common to a group of individuals or objects that distinguish it as an identifiable class or kind.[2] If we provide a set of possible data values and a set of operations that act on the values, we can think of the combination as a data type.

Let us look at two classes of data types. We will call any data type whose values we choose to consider atomic an atomic data type. Often we choose to consider integers to be atomic. We are then only concerned with the single quantity that a value represents, not with the fact that an integer is a set of digits in some number system. Integer is a common atomic data type found in most programming languages and in most computer architectures.

We will call any data type whose values are composed of component elements that are related by some structure a structured data type, or data structure. In other words, the values of these data types are decomposable, and we must therefore be aware of their internal construction. There are two essential ingredients to any object that can be decomposed—it must have component elements and it must have structure, the rules for relating or fitting the elements together.

Stack and Queue

A stack is a data type whose major attributes are determined by the rules governing the insertion and deletion of its elements. The only element that can be deleted or removed is the one that was inserted most recently. Such a structure is said to have a last-in/first-out (LIFO) behavior, or protocol. The simplicity of the data type stack belies its importance. Many computer systems have stacks built into their circuitry and have machine-level instructions to operate the hardware stack.[3] The sequencing of calls to and returns from subroutines follows a stack protocol. Arithmetic expressions are often evaluated by a sequence of operations on a stack. Many handheld calculators use a stack mode of operation. In studying computer science, you can expect to see many examples of stacks.

Queues occur frequently in everyday life and are therefore familiar to us. The line of people waiting for service at a bank or for tickets at a movie theater and the line of autos at a traffic light are examples of queues. The main feature of queues is that they follow a first-come/first-served rule. Contrary to a stack, in which the latest element inserted is the first removed or served, in queues the earliest element inserted is the first served. In social settings, the rule appeals to our sense of equality and fairness.

There are many applications of the first-in/first-out (FIFO) protocol of queues in computing. For example, the line of input/output (I/O) requests waiting for access to a disk drive in a multi-user time-sharing system might be a queue.[4] The line of computing jobs waiting to be run on a computer system might also be a queue. The jobs and I/O requests are serviced in order of their arrival, that is, the first in is the first out. There is a second kind of queue that is important. An everyday example can be seen in an emergency room of a hospital. In large emergencies it is common to first treat the worst injured patients who are likely to survive.

In computer systems, events that demand the attention of the computer are often handled according to a most-important-event/first-served, or highest-priority-in/first-out (HPIFO), rule. Such queues are called priority queue, in this type of queue service is not in order of time of arrival but rather in order of some measure of priority.

Mergesort

Two sublists, each already sorted, can be merged together to form one aggregate list that is also sorted. A simple and effective procedure for doing this, called mergesort, begins by comparing pairs of elements—one from each sublist. The smallest element is appended to a sorted list and is replaced by the next element from its sublist. This continues until there are no more elements in one of the sublists. The remaining elements in the other sublist are then appended to the sorted list, and the sort is complete.

This sounds good when there are two sorted sublists with which to begin. If there are not, the problem is to decide how to get started. There are several possibilities.

One approach is to consider individual elements as sorted sublists of length one. Pairs of these sublists are merged to produce sorted lists of length two. Pairs of these lists are then merged to produce sorted lists of length four. This process continues until only one sorted list remains.

Notice that mergesort requires two arrays—r, which originally holds the data to be sorted, and t, an array of the same type. The merges are in pairs—first from r to t, then from t to r. Thus mergesort requires space for 2*n elements.

Function calls

When a call is made to a new function, all the variables local to the calling routine need to be saved by the system, since otherwise the new function will overwrite the calling routine’s variables. Furthermore, the current location in the routine must be saved so that the new function knows where to go after it is done. The variables have generally been assigned by the compiler to machine registers, and there are certain to be conflicts, especially if recursion is involved.

When there is a function call, all the important information that needs to be saved, such as register values and the return address, is saved “on a piece of paper” in an abstract way and put at the top of a pile. Then the control is transferred to the new function, which is free to replace the registers with its values. If it makes other function calls, it follows the same procedure. When the function wants to return, it looks at the “paper” at the top of the pile and restores all the registers. It then makes the return jump.

Clearly, all of this work can be done using a stack, and that is exactly what happens in virtually every programming language that implements recursion. The information saved is called either an activation record or stack frame. The stack in a real computer frequently grows from the high end of your memory partition downwards, and on many systems there is no checking for overflow. There is always the possibility that you will run out of stack space by having too many simultaneously active functions. Needless to say, running out of stack space is always a fatal error.

In languages and systems that do not check for stack overflow, your program will crash without an explicit explanation. On these systems, strange things may happen when your stack gets too big, because your stack will run into part of your program. It could be the main program, or it could be part of your data, especially if you have a big array. If it runs into your program, your program will be corrupted; you will have nonsense instructions and will crash as soon as they are executed. If the stack runs into your data, what is likely to happen is that when you write something into your data, it will destroy stack information—probably the return address—and your program will attempt to return to some weird address and crash.[5]

Key Words

abstract	抽象，摘要
aggregate	合计，总计
appeal	要求，呼吁，倾向于
append	增补，附加
assign	分派，指派，赋值
attention	注意，注意力
attribute	属性
corrupt	腐败的，腐烂的
decomposable	可分解的
destroy	破坏
emergency	紧急，应急
essence	本质，精华，要素
ingredient	组成，成分
mergesort	归并排序
nonsense	荒谬，荒唐
overflow	溢出
overwrite	覆盖
pile	堆

priority	优先权，优先级
recursion	递归，循环
stack	栈，堆栈
survive	生存
weird	不可思议的

Notes

[1] A data structure is a data type whose values are composed of component elements that are related by some structure.

由 whose 引导的限定性定语从句修饰 a data type，that 引导的限定性定语从句修饰 component elements。

译文：数据结构是一种数据类型，其值是由与某些结构有关的组成元素所构成的。

[2] The essence of a data type is that it attempts to identify qualities common to a group of individuals or objects that distinguish it as an identifiable class or kind.

本句由两个复合句构成，均由 that 引导。第一个 that 引导表语从句；第二个 that 引导限定性定语从句，修饰 qualities，it 代表 a group of individuals or objects。

译文：数据类型的本质是标识一组个体或目标所共有的特性，这些特性把该组个体作为可识别的种类。

[3] Many computer systems have stacks built into their circuitry and have machine-level instructions to operate the hardware stack.

本句中，过去分词短语 built into their circuitry 作定语，修饰 stacks；动词不定式短语 to operate the hardware stack 也作定语，修饰 machine-level instructions。

译文：许多计算机系统的电路中都含有多个栈，并且含有操作硬件栈的机器指令。

[4] For example, the line of input/output (I/O) requests waiting for access to a disk drive in a multi-user time-sharing system might be a queue.

本句中，现在分词短语 waiting for access to a disk drive 作定语，修饰 requests；the line of I/O requests 意指请求的队列，为本句主语。

译文：例如，在多用户分时操作系统中，多个等待访问磁盘驱动器的输入 / 输出（I/O）请求就可以是一个队列。

[5] If the stack runs into your data, what is likely to happen is that when you write something into your data, it will destroy stack information—probably the return address—and your program will attempt to return to some weird address and crash.

“If the stack runs into your data”是条件状语从句，“what is likely to happen”作主语，“that”引导的是表语从句。

译文：如果栈延伸至数据，可能发生的情况是，当向数据中写入某内容时，它将会破坏栈的信息——或许是返回地址——接着程序将会试图返回到某个古怪地址并崩溃。

2.2.2 Exercises

1．Translate the following phrases into English

（1）内部结构

（2）数据类型
（3）输入/输出请求
（4）结构数据类型
（5）数据值
（6）算术表达式
（7）先来先服务
（8）函数调用

2．Translate the following phrases into Chinese

（1）last-in/first-out
（2）atomic data type
（3）stack space
（4）data structure
（5）return address
（6）fatal error
（7）run out
（8）stack information

3．Identify the following to be True or False according to the text

（1）The sequencing of calls to and returns from subroutines follows a stack protocol.
（2）Many programming languages provide the facilities for constructing arrays by using the static data.
（3）Both the stack and the queue have the same behaviors.
（4）The priority queues can use HPIFO rule.
（5）Data type is the study of methods of representing objects.
（6）We call the data type whose values are composed of component elements a structured data type.
（7）Mergesort begins by comparing pairs of elements—one from each sub-list.
（8）In languages and systems that do not check for stack overflow, your program will crash without an explicit explanation.

4．Reading Comprehension

（1）The operations of a structured data type might act on _____.
a．component values
b．component elements
c．either component values or component elements
d．neither component values nor component elements

（2）We will call any data type whose values we choose to consider atomic_____.
a．an atomic data type
b．a structured data type
c．data type
d．local data

（3）The main feature of queues is that they follow a _____ rule.

a. last-in/first-out
b. first-in/last-out
c. first-come/last-served
d. first-in/first-out

（4）The main feature of stacks is that they follow a _____ rule.

a. last-in/last-out
b. first-in/last-out
c. first-in/first-out
d. highest-priority in/first-out

2.2.3 Reading Material

Object-oriented data structure

Object-oriented software development is a contemporary approach to the design of reliable and robust software. The complexity of the implementation of software system is a combination of the complexity of the representations of information and the complexity of the algorithms that manipulate the representations. Data structure is the study of methods of representing objects, the safe, reliable encapsulation of structure, the development of algorithms that use these representations, and the measurement of both the time and space complexity of the resulting systems. The object-oriented approach emphasizes the role of objects, along with their attributes and operations, that form the nucleus of the solution.

From the point of view of deciding which data structure should represent that attributes of objects in a specific class, the emphasis that the object-oriented approach places on abstraction is very important to the software development process. Abstraction means hiding unnecessary details. Procedural abstraction, or algorithmic abstraction, is hiding of algorithmic details, which allows the algorithm to be seen or described, at various levels of detail. Building subprograms so that the names of the subprograms describe what the subprograms do and the code inside subprograms shows how the processes are accomplished is an illustration of abstraction in action.

Similarly, data abstraction is the hiding of representational details. An obvious example of this is the building of data types by combining together other data types, each of which describes a piece, or attribute, of a more complex object type. An object-oriented approach to data structures brings together both data abstraction and procedural abstraction through the packaging of the representations of classes of objects.

Once an appropriate abstraction is selected, there may be several choices for representing the data structure. In many cases there is at least one static representation and at least one dynamic representation. The typical tradeoff between static and dynamic representations is between a bounded or unbounded representation versus the added storage and time requirements associated with some unbounded representations.

After an abstraction and representation are chosen, there are competing methods to encapsulate data structures. The choice of an encapsulation is another tradeoff, between how the structure is

made available to the user and how the user's instantiating objects may be manipulated by the package. The encapsulations have an effect on the integrity of the representation, and time and space requirements associated with the encapsulation. Once specified, one or more competing methods of representation may be carried out, and the structure, its representations and its encapsulation may be evaluated relative to the problem being solved. The time and space requirements of each method must be measured against system requirements and constraints.

Object-Oriented programming differs from procedural programming because it uses objects as data structure. The structured data and its related operations could be encapsulated in a single object which may be reused and easily upgraded, augmented, replaced. So it directly reduces the cost of maintenance and the timing and extendibility of new system.

OOP promises to provide component-level software objects that can be quickly combined to build new applications that respond to changing business conditions. Because objects communicate by sending messages that can be understood by other objects, large integrated systems are easier to assemble.

Most object oriented systems are hybrid systems; they reduce the messaging overhead by using traditional programming at the lowest levels and object-oriented programming for the higher levels. Hybrid systems can approach the machine efficiency achieved by traditional programs.

Objects can be viewed as reusable components, and once the programmer has developed a library of these components, he can minimize the amount of new coding required. One user envisions a commercial library of objects which could be purchased by programmers and reused for various applications. But creating a library is no simple task because the integrity of the original software design is critical. Reusability can be a mixed blessing for users, too, as a programmer has to be able to find the object he needs. But if productivity is your aim, reusability is worth the risks.

2.3 Operating System

2.3.1 Text

An operating system is a program, which acts as an interface between a user of a computer and the computer hardware.[1] The purpose of an operating system is to provide an environment in which a user may execute programs. In general, however, there is no completely definition of an operating system. Operating systems exist because they are a reasonable way to solve the problem of creating a usable computing system. The fundamental goal of computer systems is to execute user programs and solve user problems. Towards this goal computer hardware is constructed. Since bare hardware alone is not very easy to use, application programs are developed. These various programs require certain common operations, such as controlling the I/O devices. The common functions of controlling and allocating resources are then brought together into one piece of software: the operating system.

The first operating systems were developed by manufactures for the computers in their product line. When the manufacturers came out with another computer or model, they often produced an improved and different system; this meant that users who wanted to switch computers, either from

one vendor to another or to a different model from the same vendor, would have to convert their existing programs to run under the new operating system. Today, however, the trend is away from operating system limited to a specific model and toward operating systems that will run on any model by a particular manufacturer.

There are many important reasons for learning operating system; the most notable are:

- The user must interact with the operating system in order to accomplish task since it is his primary interface with the computer;
- The selection of the operating system and its options is a major decision for most computer installations;
- Many concepts and techniques found in operating systems have general applicability in other applications;
- For special-purpose usage you may have to design your own operating system or modify on existing one.

An operating system is similar to a government. Its hardware, software, and data provide the basic resource of a computer system. The operating system provides the means for the proper use of these resources in the operation of the computer system. Like government, the operating system performs no useful function by itself. It simply provides an environment within which other programs can do useful work.

We can view an operating system as a resource allocates. A computer system has many resources which may be required to solve a problem: CPU time, memory space, file storage space, input/output devices, and so on. The operating system acts as the manager of these resources and allocates them to specific programs and users as necessary for their tasks. Since there may be many, possibly conflicting, requests for resources, the operating system must decide which requests are allocated resources to operate the computer system fairly and efficiently.[2]

Viewing the operating system as a resource manager, each manager must do the following:

- Keep track of the resources.
- Enforce policy that determines who gets what, when, and how much.
- Allocate the resource.
- Reclaim the resource.

The primary goal of an operating system is convenience for the user. Operating system exists because they are supposed to make it easier to compute with an operating system than without an operating system. This is particularly clear when you look at operating systems for small personal computers. A secondary goal is efficient operation of the computer system. This goal is particularly important for large shared multi-user systems. The systems are typically very expensive, and so it is desirable to make them as efficient as possible. These two goals, convenience and efficiency, are sometimes contradictory. In the past, efficiency considerations were often more important than convenience. Thus much of operating system theory concentrates on optimal use of computing resources.

Operating systems are either single-tasking or multitasking. The more primitive single-tasking operating systems can run only one process at a time. For instance, when the computer is printing a

document, it cannot start another process or respond to new commands until the printing is completed.

All modern operating systems are multitasking and can run several processes simultaneously. In most computers there is only one CPU, so a multitasking operating system creates the illusion of several processes running simultaneously on the CPU. The most common mechanism used to create this illusion is time slice multitasking, whereby each process is run individually for a fixed period of time.[3] If the process is not completed within the allotted time, it is suspended and another process is run. This exchanging of processes is called context switching. The operating system performs the "bookkeeping" that preserves the state of a suspended process. It also has a mechanism, called a scheduler, that determines which process will be run next. The scheduler runs short processes quickly to minimize perceptible delay. The processes appear to run simultaneously because the user's sense of time is much slower than the processing speed of the computer.

A very important responsibility of any operating system is the scheduling of jobs to be handled by a computer system.[4] This is one of the main tasks of the job management function. The operating system sets up the order in which programs are processed, and defines the sequence in which particular jobs are executed. The term job queue is often used to describe the series of jobs awaiting execution. The operating system weighs a variety of factors in creating the job queue. These include which jobs are currently being processed, the system's resources being used, which resources will be needed to handle upcoming programs, the priority of the job compared to other tasks, and any special processing requirements to which the system must respond. The operational software must be able to assess these factors and control the order in which jobs are processed.

Allocation of a system's resources is closely tied to the operating system's control of I/O operations. As access is often necessary to a particular device before I/O operations may begin, the operating system must coordinate I/O operations and the devices on which they are performed. To facilitate execution of I/O operations, most operating systems have a standard set of control instructions to handle the processing of all input and output instructions.[5] These standard instructions, referred to as the input/output control system (IOCS), are an integral part of most operating systems. They simplify the means by which all programs being processed may undertake I/O operations.

Most of the early operating system consisted simply of one big program. As systems became laeger and more comprehensive, this "brute force" approach became unmanageable. Eventually, it became clear that the extended machine approach could be applied to the operating system in two ways: (1) Key functions needed by many system modules could be separated into an "inner extended machine", and (2) certain modules could be separated out and run on the extended machine in system that like user processes.

Key Words

applicability	应用性，适用性
bookkeeping	簿记，记账
collectively	集体地，共同地

contradictory	反对的，反驳的
convenience	方便
desirable	令人向往的，可取的
efficiently	有效地
environment	环境
facilitate	促进，有帮助
fundamental	基本的，原则的
illusion	幻影，错觉
installation	安装
kernel	核心，中心
mechanism	机制
perceptible	可察觉的，看得见的
preserve	保存，维持
primitive	原始的，基本的
reasonable	合理的，适当的
reclaim	回收
resource	资源
scheduler	调度程序，调度表
suspend	暂停，挂起
unmanageable	难管理的，难处理的
upcoming	即将来临的，即将出现的

Notes

[1] An operating system is a program, which acts as an interface between a user of a computer and the computer hardware.

由“which”引导非限定性定语从句，修饰“program”。

译文：操作系统是一种程序，它是用户与计算机硬件之间的接口。

[2] Since there may be many, possibly conflicting, requests for resources, the operating system must decide which requests are allocated resources to operate the computer system fairly and efficiently.

本句由“Since”引导原因状语从句，主语是“the operating system”，“which requests are allocated…”是宾语从句。

译文：因为有许多资源请求方面可能存在冲突，操作系统必须决定给哪些请求分配资源以便计算机系统能合理而有效地运行。

[3] The most common mechanism used to create this illusion is time slice multitasking, whereby each process is run individually for a fixed period of time.

过去分词短语 used to create this illusion 作定语，修饰 mechanism；由 whereby 引导的是非限制性定语从句。

译文：产生这种错觉的最常用机制是时间分割多任务处理，以每个进程各自运行固定的一段时间的方式来实现。

[4] A very important responsibility of any operational system is the scheduling of jobs to be handled by a computer system.

这里的“to be handled by a computer system”是不定式短语作定语。

译文：操作系统的一个非常重要的职责是调度计算机系统将要处理的作业。

[5] To facilitate execution of I/O operations, most operating systems have a standard set of control instructions to handle the processing of all input and output instructions.

“To facilitate execution of I/O operations”是目的状语，“control instructions to handle the processing of all input and output instructions”是定语，修饰“a standard set”。

译文：为便于 I/O 操作的执行，大多数操作系统都有一个标准的控制指令集来处理所有输入和输出指令。

2.3.2 Exercises

1．Translate the following phrases into English

（1）文件存储空间

（2）任务切换

（3）多用户系统

（4）操作系统

（5）资源管理器

（6）多任务

（7）单任务

（8）作业队列

2．Translate the following phrases into Chinese

（1）efficient operation

（2）controlling the I/O devices

（3）allocate resource

（4）key functions

（5）input/output control system

（6）system module

（7）concentrate on

（8）control instruction

3．Identify the following to be True or False according to the text

（1）Most of the early operating system consisted simply of one big program.

（2）Without an operating system, we could not execute a user program.

（3）The basic resources of a computer system are software and data.

（4）Operating systems can allocate one or many resources to solve a problem.

（5）Operating systems can only be used in multitask systems.

（6）Operating systems can run several processes simultaneously.

（7）The operating systems only consider the time in creating the job queues.

（8）The operating system sets up the order in which programs are processed, and defines the sequence in which particular jobs are executed.

4. Reading Comprehension

（1）The _____ serves as an interface between hardware and software.

a. system

b. application program

c. operating system

d. control unit

（2）The term _____is often used to describe the series of jobs awaiting execution.

a. file queue

b. task queue

c. job queue

d. process queue

（3）Most operating systems have a standard set of _____ to handle the processing of all input and output instructions.

a. spreadsheet

b. control instructions

c. I/O operation

d. data table

（4）The two goals of an operating system are _____ and efficiency.

a. quick

b. convenience

c. standardize

d. optimize

2.3.3 Reading Material

The introduction to Operating System Technology

Windows XP

Windows XP is the next version of Microsoft Windows beyond Windows 2000 and Windows Millennium. Windows XP brings the convergence of Windows operating systems by integrating the strengths of Windows 2000—standards-based security, manageability and reliability with the best features of Windows 98 and Windows Me—Plug and Play, easy-to-use user interface, and innovative support services to create the best Windows yet. Windows XP is built on an enhanced Windows 2000 code base, with different versions aimed at home users and business users: Windows XP Home Edition and Windows XP Professional. While maintaining the core of Windows 2000, Windows XP features a fresh new visual design. Common tasks have been consolidated, and simplified, and new visual cues have been added to help you navigate your computer more easily.

Linux

Linux is an operating system, which acts as a communication service between the hardware and

the software of a computer system. The Linux kernel contains all of the features that you would expect in any operating system. Linux offers powerful and sophisticated system management facilities, a rich cadre of device support, a superb reputation for reliability and robustness, and extensive documentation.

Unlike Windows, Linux is inherently modular and can be easily scaled into compact configurations—barely larger than DOS—that can even fit on a single floppy. What's more, since Linux source code is freely available, it is possible to customize the operating system according to unique embedded system requirements. Open-source Linux has created a new operating system development and support paradigm wherein thousands of developers continually contribute to a constantly evolving Linux code base. In addition, dozens of Linux-oriented software companies have sprung up—eager to support the needs of developers building a wide range of applications, ranging from factory automation to intelligent appliances.

For many embedded systems, the main challenge in embedding Linux is to minimize system resource requirements in order to fit within constraints such as RAM, solid state disk (SSD), processor speed, and power consumption. Embedded operation may require booting from a DiskOnChip or CompactFlash SSD; or booting and running without a display and keyboard; or loading the application from a remote device via an Ethernet LAN connection. There are many sources of ready-made small foot-print Linux. Included among these are a growing number of application-oriented Linux configurations and distributions that are tuned to specific applications. Some examples are routers, firewalls, Internet/network appliances, network servers, gateways, etc.

Although Linux is not a real-time operating system, there are currently several add-on options available that can bring real-time capabilities to Linux-based systems. The most common method is the dual-kernel approach. In the case of Linux, you can retain full compatibility with standard Linux, while adding real-time functions in a non-interfering manner.

Windows Vista

Windows Vista is the latest generation of Microsoft's operating system. As Microsoft's newest operating system, Vista has introduced "Life Immersion" concept for the first time, namely, it integrates many human factors in the system and everything is people-oriented, causing the operating system to close to the user as best as possible, to understand user's feeling, and to make convenience for the user.

Vista's minimum system requirements are significant but still relatively modest. They consist of a "modern" 800MHz processor, 512MB of RAM and a 20GB hard drive. Systems that meet these criteria can run Windows Vista basic and rated as Windows Vista "Capable" by Microsoft.

Microsoft assures you that Windows Vista will bring transparency to your world, so you can more safety and confidently rely on your PC. Get more lively multimedia experience with dynamic audio-video output, music and TV, exclusively on your Windows Vista-based PC.

As far as security is concerned, the older versions of Windows, had a lot of security problems. It is the hackers who invade the system, sitting miles away from the system, and take the data that they need, such as personal information, banking details, that one might have stored in the computer. The

default browser Internet Explorer for Windows Vista has been upgraded to 7.0. It contains a lot of security features, like protected mode browsing, anti-phishing, outbound and inbound firewall, standard user account functionality, user account control, windows defender, and parental control.

Windows Vista provides new amazing graphics functions. With Windows Vista, Microsoft has surpassed Mac OS (the Macintosh operating system developed by Apple) in terms of graphics. It is the first time that Microsoft offers a great deal of high-quality graphics including 3D effects. This will help to boost programs meant for 3D games.

In the field of wireless networking function, one will see much more changes in the final release of Windows Vista. In Windows Vista, one can save the wireless connection setting and also one can name it. One can try to reconnect using these settings.

2.4 Principles of Compiler

2.4.1 Text

A compiler is a program which takes text in high-level language and converts it into equivalent text in a low-level assembly or machine language.[1] Let's overview the seven major components common to most existing compilers and to examine their interconnections. The seven components are as follow:

- Scanner
- Parser
- Intermediate code generator
- Semantic processor
- Optimizer
- Code generator
- Tables

Not all compilers have each of these modules as physically independent entities. For example, the scanner may be integrated into the parser, or semantic processor may be integrated into the parser, and so on. Conceptually, however it is easier to decompose any compiler into these seven components.

The scanner in other books is called lexical analyzer. When a program is first input into a compiler, it is just one long stream of characters, perhaps broken into lines or records reflecting the input medium. The scanner converts this external view of the source program into an internal format more suited for further manipulation by the remainder of the compiler.[2]

The scanner has several roles:

- Identify the basic lexical units of the program, which are called tokens;
- Remove extraneous blanks, carriage returns and other characteristics of the input medium;
- Remove comments;
- Report errors which the scanner discovers.

Typically, a scanner will make one pass over the text in its original form, carrying out its four tasks as this pass proceeds and output the program in some internal format, a token at a time, to the

parser upon request or as one large file of tokens. Usually, the scanner examines the text character by character.

Based upon the symbol it is currently examining, plus its knowledge of the text it has previously seen, the scanner determines whether the symbol it is currently processing is part of a comment, an extraneous blank, the beginning of a new token, the continuation of an old token or some illegally placed symbol. The scanner, then, takes the appropriate action with respect to the output it must generate. At the lexical level, the lexical units of the program consist of identifiers, keywords, numbers, and delimiters.

Each programming language has its own set of grammar rules characterizing the correct form of programs in the language. The parser or syntactic analyzer accepts the output of the scanner; i.e., token and verifies that the source program satisfies the grammatical rules of the language being compiles. In English, the grammar rules are normally not stated with great precision. However, the syntax of each programming language is simple enough so that it can be written in a precise mathematical notation called a context-free grammar. Using such a schema, it is possible to mechanically classify programs into those which do and do not belong to the language under consideration.

The tree output by the parser is transformed into a “program” of sorts written in an intermediate code, which is closer in form to assembly language than source text and yet is in a form which makes further manipulation easier than if actual assembly (or machine) code were emitted. Since the intermediate level code is machine-like in character, but not in form, it will normally vary with the machine for which the object code is being generated.[3] For example, the intermediate code generated by a compiler for a computer with a stack architecture such as B5500 will probably differ from that for a computer which has a more conventional Von Neumann structure.

Intermediate code can be converted directly into the language by the code generator. However, it is common to insert another component between the semantic processor and the code generator; namely, the optimizer (code optimization). If the code generator transforms intermediate level text into assembly language in a straightforward manner, the generated object codes probably not as efficient with respect to execution time and storage space as it might be. If a compiler is more than superficially concerned with producing efficient code, as most commercial compilers must be, it will include a module specifically designed to improve some combination of time and space characteristics of the code. The optimizer modifies the code which it is given into a more efficient version.

We classify optimization techniques into two categories: those which are performed on the source program (its internal form) and which are therefore independent of the object language, and those which are performed on the object program level.

The code generator takes the intermediate code it receives the optimizer and produces assembly or machine language code (the object program); obviously code generation is highly machine-dependent. Hence, whenever the object machine is altered, the code generator must be extensively revised. On the other hand, the other components are somewhat more insensitive to the machine for which code is being generated; however, none of the compiler modules is, in general,

totally immune to a change in the target machine.

A compiler should try to find as many errors as possible in source program.[4] There are three stages of error processing:

- Detection
- Reporting
- Recovery

The first in error processing is the detection of any error. According to the time when the error is uncovered, errors can be classified into two major categories: those suited for compile time and those suited for execution time. For detecting compile time errors, each major compiler component can detect a different class of errors. The first of these is the scanner, which can detect lexical errors.[5] The parser then will be able to detect all syntactic errors. Third, semantic errors are detected by the action routine called within the semantic processor. Run time errors can be detected either by the execution environment or by code inserted into the object program by the compiler specifically to perform certain checks.

The second stage in error processing is the report of an error. Once an error is detected, it must be reported both to the user and to whatever agent will handle that error. Error messages should be written in clear, unambiguous English prose, never in cryptic or abbreviated format. They should pinpoint the location and nature of the error and wherever possible, also indicate how that error might be repaired by the programmer. The message should also indicate the recovery action taken.

The final stage of error processing concerns the actions taken after an error has been reported. There are several recovery strategies ranging from attempting to repair an erroneous program to aborting execution of the compiler or object code. The “best” recovery strategy varies with the nature and severity of the error and partly with the judge of the compiler writer as well.

Key Words

abbreviate	缩写
conceptually	概念地
continuation	连续，继续
delimiter	界符
detection	发现，探测
emit	发出
equivalent	等价的，同等的
erroneous	错误的
extraneous	非必要的，无关的
illegally	不合规定地，非法地
immune	不受影响的
lexical	词汇的，词法的
normally	正常地，正规地
optimizer	优化程序
parser	语法分析程序

pinpoint	精确地找到
recovery	恢复
revise	校正，修订
severity	严格
straightforward	直接的，明确的
superficially	表面地，肤浅地
token	记号，标记
unambiguous	明确的

Notes

[1] A compiler is a program which takes text in high-level language and converts it into equivalent text in a low-level assembly or machine language.

本句中，由“which”引导的定语从句，修饰“program”。

译文：编译程序是指将用高级语言书写的文本转换成等价的用低级的汇编语言或机器语言书写的文本。

[2] The scanner converts this external view of the source program into an internal format more suited for further manipulation by the remainder of the compiler.

这里的“the source program”作定语，修饰“this external view”，“more suited for…”也是定语，修饰“an internal format”。

译文：扫描程序是把源程序这种外部形式转换成更适用于编译程序其他部分操作的内部形式。

[3] Since the intermediate level code is machine-like in character, but not in form, it will normally vary with the machine for which the object code is being generated.

由“Since”引导的原因状语从句阐述中间代码的特性，“it”指代“the intermediate level code”。

译文：由于中间级代码在形式上不同、但在特性上类似于机器代码，它通常随着机器的不同而产生不同的目标代码。

[4] A compiler should try to find as many errors as possible in source program.

本句中的“as…as”结构，表示比较关系。

译文：一个编译程序应将源程序中的错误尽可能多地查找出来。

[5] The first of these is the scanner, which can detect lexical errors.

本句由“which”引导的非限定性定语从句，对先行词“scanner”做进一步说明。

译文：第一部分是扫描器，它可以查出词法错误。

2.4.2 Exercises

1．Translate the following phrases into English

（1）语法规则

（2）代码生成器

（3）运行时错误

（4）上下文无关语法

（5）词法分析器
（6）目标机器
（7）中间代码
（8）源程序

2．Translate the following phrases into Chinese

（1）syntactic analyzer
（2）code optimization
（3）syntactic error
（4）internal format
（5）stream of characters
（6）semantic processor
（7）programming language
（8）mathematical notation

3．Identify the following to be True or False according to the text

（1）The scanner may be integrated into the parser.
（2）We can think the scanner as lexical analyzer.
（3）The scanner can’t discover errors.
（4）The tree output by the parser is transformed into a “program” of sorts written in an intermediate code.
（5）Intermediate code can’t be converted directly into the language by the code generator.
（6）Recovery is one of the stages of error detection.
（7）We can detect run time errors by the execution environment.
（8）The final stage of error processing concerns the actions taken after an error has been reported.

4．Reading Comprehension

（1）Which module does not belong to a compiler? _____

a．scanner
b．optimizer
c．tables
d．operating system

（2）The_____ has the function to remove comments.

a．scanner
b．parser
c．code generator
d．optimizer

（3）The second stage in error processing is _____ .

a．the detection of an error
b．the report of an error
c．the recovery of an error
d．the translation of an error

（4）Each programming language has its own set of _____ characterizing the correct form of programs in the language.

a. instructions
b. codes
c. comments
d. grammar rules

2.4.3 Reading Material

Compiler Design

In the past, compilers were divided into many passes to save space. A pass in this context is a run of the compiler through the source code of the program to be compiled, resulting in the building up of the internal data of the compiler. When each pass is finished, the compiler can free the internal data space needed during that pass. This “multi-pass” method of compiling was the common compiler technology at the time, but was also due to the small main memories of host computers relative to the source code and data.

Many modern compilers share a common “two stage” design. The front end translates the source language into an intermediate representation. The second stage is the back end, which works with the internal representation to produce code in the output language. The front end and back end may operate as separate passes, or the front end may call the back end as a subroutine, passing it the intermediate representation.

This approach mitigates complexity separating the concerns of the front end, which typically revolve around language semantics, error checking, and the like, from the concerns of the back end, which concentrates on producing output that is both efficient and correct. It also has the advantage of allowing the use of a single back end for multiple source languages, and similarly allows the use of different back ends for different targets.

Often, optimizers and error checkers can be shared by both front ends and back ends if they are designed to operate on the intermediate language that a front-end passes to a back end. This can let many compilers (combinations of front and back ends) reuse the large amounts of work that often go into code analyzers and optimizers.

The compiler front end consists of multiple phases itself, each informed by formal language theory.

（1）Lexical analysis—It breaks the source code text into small pieces (tokens or terminals), each representing a single atomic unit of the language, for instance a keyword, identifier or symbol names. The token language is typically a regular language, so a finite state automaton constructed from a regular expression can be used to recognize it. This phase is also called lexing or scanning.

（2）Syntax analysis—It identifies syntactic structures of source code. It only focuses on the structure. In other words, it identifies the order of tokens and understands hierarchical structures in code. This phase is also called parsing.

（3）Semantic analysis—It is to recognize the meaning of program code and start to prepare for

output. In that phase, type checking is done and most of compiler errors show up.

（4）Intermediate language generation—It is an equivalent to the original program is created in an intermediate language.

While there are applications where only the compiler front end is necessary, such as static language verification tools, a real compiler hands the intermediate representation generated by the front end to the back end, which produces a functional equivalent program in the output language. This is done in multiple steps:

（1）Compiler analysis—This is the process to gather program information from the intermediate representation of the input source files. Typical analysis are variable define-use and use-define chain, data dependence analysis, alias analysis, etc. Accurate analysis is the base for any compiler optimizations. The call graph and control flow graph are usually also built during the analysis phase.

（2）Optimization—The intermediate language representation is transformed into functionally equivalent but faster (or smaller) forms. Popular optimizations are in-line expansion, dead code elimination, constant propagation, loop transformation, register allocation or even auto parallelization.

（3）Code generation—The transformed intermediate language is translated into the output language, usually the native machine language of the system. This involves resource and storage decisions, such as deciding which variables to fit into registers and memory and the selection and scheduling of appropriate machine instructions along with their associated addressing modes.

2.5 Database Technologies

2.5.1 Text

A database-management system (DBMS) consists of a collection of interrelated data and a set of programs to access those data. The collection of data, usually referred to as the database, contains information about one particular enterprise. The primary goal of a DBMS is to provide an environment that is both convenient and efficient to use in retrieving and storing database information.

Database systems are designed to manage large bodies of information. The management of data involves both the definition of structures for the storage of information and the provision of mechanisms for the manipulation of information. In addition, the database system must provide for the safety of the information stored, despite system crashes or attempts at unauthorized access.[1] If data are to be shared among several users, the system must avoid possible anomalous results. The importance of information in most organizations—which determines the value of the database—has led to the development of a large body of concepts and techniques for the efficient management of data.

The storage structure and access methods used by the database system are specified by a set of definitions in a special of DDL called a data storage and definition language.[2] The result of compilation of these definitions is a set of instructions to specify the implementation details of the database schemas-details are usually hidden from the users. A database schema is also specified by

DDL. The result of compilation of DDL statements is a set of tables that is stored in a special file called data dictionary, or data directory. A data dictionary is a file that contains metadata-that is, data about data. This file is consulted before actual data are read or modified in the database system.

Transaction Management

A transaction is a collection of operations that performs a single logical function in a database application. Each transaction is a unit of both atomicity and consistency. Thus, we require that transactions do not violate any database-consistency constraints. That is, if the database was consistent when a transaction started, the database must be consistent when the transaction successfully terminates. However, during the execution of a transaction, it may be necessary temporarily to allow inconsistency. This temporary inconsistency, although necessary, may lead to difficulty if a failure occurs.

It is the responsibility of the programmer to define properly the various transactions, such that each preserves the consistency of the database. For example, the transactions to transfer funds from account A to account B could be defined to be composed of two separate programs: one that debits account A, and another that credits account B. The execution of these two programs one after the other will indeed preserve consistency. However, each program by itself does not transform the database from a consistent state to a new consistent state. Thus, those programs are not transactions.

Ensuring the atomicity and durability properties is the responsibility of the database system itself-specifically, of the transaction-management component. In the absence of failures, all transactions complete successfully, and atomicity is achieved easily. However, due to various types of failure, a transaction may not always complete its execution successfully. If we are to ensure the atomicity property, a failed transaction must have no effect on the state of the database. Thus, the database must be restored to the state in which it was before the transaction in question started executing. It is the responsibility of the database system to detect system failures and to restore the database to a state that existed prior to the occurrence of the failure.

Storage Management

Database typically requires a large amount of storage space. Corporate databases are usually measured in terms of gigabytes or, for the largest databases, terabytes of data. A gigabyte is 1024 megabytes（2^{20} bytes）, and a terabyte is 1 million megabytes (2^{30} bytes). Since the main memory of computers cannot store this much information, the information is stored on disks. Data are moved between disk storage and main memory as needed. Since the movement of data to and from disk is slow relative to the speed of the central processing unit, it is impetrative that the database system structures the data so as to minimize the need to move data between disk and main memory.

The goal of a database system is to simplify and facilitate access to data.[3] High-level views help to achieve this goal. Users of the system should not be burdened unnecessarily with the physical details of the implementation of the system. Nevertheless, a major factor in a user’s satisfaction or lack thereof with a database system is that system’s performance. If the response time for a request is

too long, the value of the system is diminished.[4] The performance of a system depends on what the efficiency is of the data structures used to represent the data in the database, and on how efficiently the system is able to operate on these data structures. As is the case elsewhere in computer systems, a tradeoff must be made not only between space and time, but also between the efficiency of one kind of operation and that of another.

A storage manager is a program module that provides the interface between the low-level data stored in the database and the application programs and queries submitted to the system. The storage manager is responsible for the interaction with the file manager. The raw data are stored on the disk using the file system, which is usually provided by a conventional operating system. The storage manager translates the various DML statements into low-level file-system commands. Thus, the storage manager is responsible for storing, retrieving, and updating of data in the database.

Database Administrator

One of the main reasons for using DBMS is to have central control of both the data and the programs that access those data. The person who has such central control over the system is called the database administrator (DBA). The functions of the DBA include the following:

- Schema definition. The DBA creates the original database schema by writing a set of definitions that is translated by the DDL compiler to a set of tables that is stored permanently in the data dictionary.[5]
- Storage structure and access-method definition. The DBA creates appropriate storage structures and access methods by writing a set of definitions, which is translated by the data-storage and data-definition-language compiler.
- Schema and physical-organization modification. Programmers accomplish the relatively rare modifications either to the database schema or to the description of the physical storage organization by writing a set of definitions that is used by either the DDL compiler or the data-storage and data-definition-language compiler to generate modifications to the appropriate internal system tables (for example, the data dictionary).
- Granting of authorization for data access. The granting of different types of authorization allows the database administrator information is kept in a special system structure that is consulted by the database system whenever access to the data is attempted in the system.
- Integrity-constraint specification. The data values stored in the database must satisfy certain consistency constraints. The integrity constraints are kept in a special system structure that is consulted by the database system whenever an update takes place in the system.

Key Words

anomalous	不规则的，反常的
atomicity	原子数，原子性
burden	负担，责任
compilation	编辑，编纂
consistency	一致性

consult	商量，协商
conventional	传统的，常规的
corporate	社团的，合作的
diminish	使减少，使变小
durability	持久性
enterprise	企业，企事业
failure	失败，不足
grant	允许，授予
impetrative	祈求，恳求
implementation	实行，履行
inconsistency	不一致性
interrelate	（使）相互关联
modification	修正，修改
occurrence	发生，出现
permanently	永久地，持久地
responsibility	责任，职责
schema	概要，图解
terabyte	太字节
tradeoff	交换，交易，折中
transaction	交易，和解协议
unauthorized	未经许可的
violate	违反，侵犯

Notes

[1] In addition, the database system must provide for the safety of the information stored, despite system crashes or attempts at unauthorized access.

此句中“despite”引导的是让步状语从句。

译文：另外，数据库系统还必须提供所存储信息的安全性保证，即使在系统崩溃或有人企图越权访问时也应保障信息的安全性。

[2] The storage structure and access methods used by the database system are specified by a set of definitions in a special of DDL called a data storage and definition language.

“The storage structure and access methods”是本句的主语，而“used by the database system”做主语的定语。

译文：数据库系统所使用的存储结构和访问方式通过一系列特殊的 DDL 语句来定义，这种特殊的 DDL 语句称为数据存储定义语言。

[3] The goal of a database system is to simplify and facilitate access to data.

“to simplify and facilitate access to data”作表语，“a database system”是定语，修饰主语“the goal”。

译文：数据库系统的目标是要简化和辅助数据访问。

[4] If the response time for a request is too long, the value of the system is diminished.

本句中，“If the response time for a request is too long”做条件状语从句。

译文：如果一个请求的响应速度太慢，系统的价值就会下降。

[5] The DBA creates the original database schema by writing a set of definitions that is translated by the DDL compiler to a set of tables that is stored permanently in the data dictionary.

本句中，“that is translated by …”做定语，修饰“definitions”，“that is stored permanently in the data dictionary”做“tables”的定语。

译文：DBA 通过书写一系列的定义来创建最初的数据库模式，这些定义被 DDL 编译器翻译成永久地存储在数据字典中的表集合。

2.5.2 Exercises

1．Translate the following phrases into English

（1）物理存储组织

（2）数据库管理系统

（3）事务管理

（4）数据定义语言

（5）数据字典

（6）数据库管理员

（7）完整性约束

（8）物理细节

2．Translate the following phrases into Chinese

（1）database system

（2）take place

（3）database schema

（4）single logical function

（5）database-consistency constraints

（6）detect system failures

（7）storage manager

（8）schema definition

3．Identify the following to be True or False according to the text

（1）Databases are usually measured in terms of MB or GB.

（2）The goal of a database system is not to simplify access to database.

（3）A storage manager provides the interface between a database and a application program.

（4）A data definition language can be used to define a database schema.

（5）Integrity constraint specification is a function of the storage management.

（6）Metadata means data about data.

（7）A transaction is a collection of operations in a database application.

（8）The data values stored in the database must satisfy certain consistency constraints.

4．Reading Comprehension

（1）Please find the item that is not belong to the DBA._____

a．storage structure and access method definition

b. schema definition
c. integrity constraint specification
d. DDL

（2）The raw data are stored on the disk using the _____.
a. data dictionary
b. file system
c. DBMS
d. DBA

（3）Each _____ is a unit of both atomicity and consistency.
a. transaction
b. database
c. storage structure
d. schema details

（4）_____is designed to manage large bodies of information.
a. A file system
b. A transaction
c. A database system
d. A database language

2.5.3 Reading Material

Universal Data Access

Universal Data Access (UDA) is Microsoft's strategy for providing access to information across the enterprise. Today, companies building database solutions face a number of challenges as they seek to gain maximum business advantage from the data and information distributed throughout their corporations. UDA provides high-performance access to a variety of information sources, including relational and non-relational, and an easy to use programming interface that is tool and language independent. These technologies enable corporations to integrate diverse data sources, create easy-to-maintain solutions, and use their choice of breed tools, applications, and platform services.

Microsoft Data Access Components (MDAC) provides easy-to-use, high-performance access to all types of data throughout the enterprise. Developers creating client/server and Internet/ Intranet-based data driven solution use these components to easily integrate information from a variety of sources, both relational and non-relational.

The ActiveX Data Objects (ADO) programming model represents the best of the existing Microsoft data access programming models. ADO provides consistent, high-performance access to data, whether you are creating front-end database client or middle tier business object using an application, tool, language, or even an Internet browser. ADO is the single data interface you need to know for 1 to n tier client/server and Web-based data-driven solution development. If you are familiar with Data Access Objects (DAO) or Remote Data Objects (RDO), you will recognize the

interfaces and will be able to work with them very quickly. The ADO objects provide you with the fastest, easiest and most productive means for accessing all kinds of data sources.

Open Database Connectivity (ODBC) is a widely accepted application programming interface (API) for database access. It is based on the Call Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language.

ODBC is designed for maximum interoperability, that is, the ability of a single application to access different database management systems with the same source code. Database applications call functions in the ODBC interface, which is implemented in database—specific modules called drivers. The use of drivers isolates applications from database—specific calls in the same way that printer drivers isolate word processing programs from printer—specific commands. Because drivers are loaded at run time, a user only has to add a new driver to access a new DBMS; it is not necessary to recompile or re-link the application.

DAO provide a framework for using code to create and manipulate databases. DAO supplies a hierarchical set of objects that use the Microsoft Jet database engine to access data and database structure in:

- Microsoft Jet (. MDB) databases.
- ODBC data sources, using an ODBC driver.
- Installable ISAM databases, such as dBASE, Paradox and Microsoft Foxpro which the database engine can read directly.

RDO provide an information model for accessing remote data sources through ODBC. RDO offers a set of objects that make it easy to connect to a database, execute queries and stored procedures, manipulate results, and commit changes to the server. It is specifically designed to access remote ODBC relational data sources, and makes it easier to use ODBC without complex application code, and is a primary means of accessing a relational database that is exposed with an ODBC driver. RDO implements a thin code layer over the Open Database Connectivity API and driver manager that establishes connections, creates result sets and cursors, and executes complex procedures using minimal workstation resources.

Unit 3 Multimedia and Its Applications

3.1 Multimedia

3.1.1 Text

As the name suggests, multimedia is a set of more than one media element used to produce a concrete and more structured way of communication. In other words, multimedia is simultaneous use of data from different sources. These sources in multimedia are known as media elements. With growing and very fast changing information technology, multimedia has become a crucial part of computer world. Its importance has realized in almost all walks of life, it may be education, cinema, advertising, fashion and so on.

Throughout the 1960s, 1970s and 1980s, computers have been restricted to deal with two main types of data—words and numbers. But with the development of the technology, computers are capable of handling graphics, audio, animation and video.

Elements of Multimedia

We break the word multimedia into its component part, we get multi—meaning more than one, and media—meaning form of communication. Those types of media include text, audio sound, static graphics images, animation and full-motion video. Because of what hardware can and cannot do, it is often a trade-off between a certain number of static graphics images, audio sound, full-motion video and text. As you may guess, textual information takes the least amount of space to store.

1. Text

Whether or not they have used a computer, most people are familiar with text. Text is the basis for word processing programs and is still the fundamental information used in many multimedia programs.

In fact, many multimedia applications are based on the conversion of a book to a computerized form. This conversion gives the user immediate access to the text and lets him or her display pop-up windows, which give definitions of certain words. Multimedia applications also enable the user to instantly display information related to a certain topic that is being viewed. Most powerfully, the computerized form of a book allows the user to look up information quickly (without referring to the index or table of contents).

The Windows operating environment gives the user an almost infinite range of expressing text.[1] By displaying text in more than one format, the message a multimedia application is trying to portray can be made more understandable.

One type of application, which many people use every day, is the Windows Help Engine.[2] This application is a text-based information viewer that makes accessing information related to a certain

topic easy.

2. Audio Sound

The integration of audio sound into a multimedia application can provide the user with information not possible through any other method of communication. Some types of information can't be conveyed effectively without using sound. It is nearly impossible, for example, to provide an accurate textual description of the bear of a heart or the sound of the ocean. Audio sound can also reinforce the user's understanding of information presented in another type of media. For example, a narration might describe what is being seen in an animation clip. This can enhance the understanding of what the application is all about and lead to better comprehension. Experts in learning have found that presenting information using more than one sense aids in later retention of the information. Most importantly, it can also make the information more interesting to the user.

Audio sound is available in several different formats. Today, maybe the most common type of audio is red book audio. This is the standard specification used to refer to consumer audio compact discs. It is an international standard and is officially known as IEC 908. This specification is called red book audio because of the color of the cover of the publication that describes its formats. Red book audio sound can also be used in multimedia applications, and it forms the basis of the highest quality sound available.

Another audio sound format is the Windows wave file, which can be played only on PCs running the Windows operating environment. A wave file contains the actual digital data used to play back the sound as well as a header that provides additional information about the resolution and playback rate. Wave files can store any type of sound that can be recorded by a microphone.

The final type of audio sound that may be used is known as the Musical Instrument Digital Interface, or MIDI for short. The MIDI format is actually a specification invented by musical instrument manufacturers. Rather than being a digitized form of the sound, the MIDI specification is actually a set of messages that describes what musical note is being played. The MIDI specification cannot store anything except in the form of musical notes. MIDI music can be created with a sequencer.

3. Static Graphics Images

When you imagine graphics images you probably think of "still" images-that is, images such as those in a photograph or drawing. There is no movement in these types of picture. Static graphics images are an important part of multimedia because humans are visually oriented.[3] Windows is also a visual environment. This makes displaying graphics images easier than it would be in a DOS-based environment.

Static graphics images have a number of formats and can be created in a number of different ways. Just as you can see an unlimited number of photographs or pictures, the types of static graphics images that you can include in a multimedia application are almost unlimited.

4. Animation

Animation refers to moving graphics images. The movement of somebody giving CPR makes it much easier to learn cardiopulmonary resuscitation, rather than just viewing a static picture. Just as a static graphics, image is a powerful form of communication, such is the case with animation.

Animation is especially useful for illustrating concepts that involve movement. Such concepts as playing a guitar or hitting a golf ball are difficult to illustrate using a single photograph, or even a series of photographs, and even more difficult to explain using text. Animation makes it easier to portray these aspects of your multimedia application.

5. Full-Motion Video

Full-motion video, such as the images portrayed in a television, can add even more to a multimedia application.[4] Although full-motion video may sound like an ideal way to add a powerful message to a multimedia application, it is nowhere near the quality you would expert after watching television.[5] Full-motion video is still in its beginning stages on PCs, and it is limited in resolution and size. Even with advanced methods of data compression, full-motion video can suck up hard disk space faster than water falls when poured out of a bucket.

Application of multimedia

Faster computers and the rapid growth of multimedia programs will probably forever change the way people get information. By using multimedia, we can see the information clearly. Many things, for example, electronic games, movies, games and songs make multimedia one of the computer worlds most exciting and creative fields.

Electronic Games—By far the most widely used form of interactive multimedia are the electronic games. Almost each game is a highly interactive multimedia application that presents layered 3D animation with synchronized sound and music effects.

Hypermedia Browsers—Hypermedia is a way of organizing multimedia information by linking media elements. The elements being linked are called nodes and the entire assemblage is a hypermedia web. When a link exists between two nodes they should be related in some fashion. For instance, a digital image can be linked to a textual description of the image.

Multimedia Presentation Systems—A multimedia presentation system provides interactive presentation, and synchronously manipulates multimedia material. Examples include “presentation software”, used to compile and display electronic “slides”, and browsers for multimedia documents.

Desktop Conferencing Systems—A desktop computer equipped with microphone, speakers, and a video camera, and placed on a multimedia network, can establish audio and video connections with other, similarly equipped machines. This is the basis of desktop conferencing, when the computer plays the role of a multimedia communication device. The participants can simultaneously edit the shared objects and view each other’s changes.

Multimedia Services—Many multimedia applications fit under the broad heading of “multimedia services”. The multimedia services include interactive shopping, banking, educational and medical services where multimedia is used to enrich the interface, and VOD, where users play back remotely stored digital video in their homes.

Key Words

assemblage	装配，集合
cardiopulmonary	心肺

computerize	计算机化
concrete	具体的，实际的
conversion	变换，转化，换位
crucial	极紧要的，决定性的
guitar	吉他
hypermedia	超媒体
multimedia	多媒体
narration	叙述，故事
officially	官方的，公认的，正式的
participant	参加者，参加的，参与的
portray	描绘，描写，描述
reinforce	增强，加固
restrict	限制，限定
resuscitation	复苏，复兴，再兴
retention	保留，保持
textual	文本的，教科书的

Notes

[1] As a multimedia programmer, you can choose what font to display text in, how big (or small) it should be, and what color it should be displayed in.

“As a multimedia programmer”作状语，“what …, how…, what…”是并列的宾语从句。

译文：一个多媒体程序员可以选择要显示文本的字体、字号大小以及颜色。

[2] One type of application, which many people use every day, is the Windows Help Engine.

本句的“which many people use every day”是非限定性定语从句。

译文：Windows 帮助模块是许多人天天用到的多媒体应用程序。

[3] Static graphics images are an important part of multimedia because humans are visually oriented.

本句由“because”引导原因状语从句。

译文：静态图像是多媒体的重要部分，因为人类是视觉定位的。

[4] Full-motion video, such as the images portrayed in a television, can add even more to a multimedia application.

本句的“such as…”是“Full-motion video”的同位语。

译文：全运动影像，例如电视里的图像，可使多媒体的应用更为广泛。

[5] Although full-motion video may sound like an ideal way to add a powerful message to a multimedia application, it is nowhere near the quality you would expert after watching television.

本句由“although”引导让步状语从句。

译文：虽然全运动影像听起来像是一个往多媒体程序中加入强有力信息的理想方法，但它无法达到人们看电视一样的效果。

3.1.2 Exercises

1．Translate the following phrases into English

（1）同步声音

（2）数据压缩

（3）字处理程序

（4）多媒体演示系统

（5）文字的信息

（6）多媒体服务

（7）弹出式窗口

（8）国际标准

2．Translate the following phrases into Chinese

（1）digital image

（2）media element

（3）playback rate

（4）full-motion video

（5）multimedia application

（6）Desktop Conferencing System

（7）Musical Instrument Digital Interface

（8）hard disk space

3．Identify the following to be True or False according to the text

（1）Multimedia is not a simultaneous use of data from different sources.

（2）The Windows operating environment gives the user a finite range of expressing text.

（3）Windows wave file can not be played on PCs running the Windows operating environment.

（4）Hypermedia is a way of organizing multimedia information by linking media elements.

（5）The computerized form of a book allows the user to look up information quickly.

（6）Experts in learning have found that presenting information using more than one sense aids in later retention of the information.

（7）The types of media include text, audio sound, static graphics images, animation and full-motion video.

（8）By far the most widely used form of interactive multimedia are word processor.

4．Reading Comprehension

（1）_____is the basis for word processing programs and is still the fundamental information used in many multimedia programs.

a．Graphics image

b．Sound

c．Text

d．Table

（2）Static graphics images have a number of _____and can be created in a number of different ways.

a．data

b. texts
c. elements
d. formats

（3）The integration of audio sound into a_____can provide the user with information not possible through any other method of communication.

a. multimedia application
b. text
c. graphic image
d. application

（4）By displaying text in more than one format, the message a multimedia application is trying to portray can be made more_____.

a. difficult
b. understandable
c. easier
d. quickly

3.1.3 Reading Material

The next step in 3D storage

As the demand from businesses and consumers for data storage explodes, developers of optical storage technologies are scrambling to condense more and more bytes into a smaller space. Until the long-awaited promise of holography as a storage medium is realized, fluorescent multilayer discs (FMD) may do quite nicely.

Constellation 3D Inc. (C3D) in New York has come up with a method of using red lasers and fluorescent dye to increase to 10 the number of information layers that can be put on each side of a disc, while matching the density and transfer speeds of DVD. In the future, the discs could have as many as 100 layers.

CD-ROMs use one information layer that reflects an infrared laser to supply 650MB of storage on a one-sided disc. DVDs use a red laser to supply up to 9GB of storage on a two-sided disc with two layers of storage per side.

In FMD technology, fluorescent dye replaces the reflective and semi-reflective coating in which information is stored in CD-ROMs and DVDs. This allows for more layers of information, because laser light is not blocked from traveling deeper into the medium.

There is less noise and interference in the return signal as well. That because the fluorescent light that emitted when a focused laser strikes a pit on one of the information layers has a different wavelength than the laser. The emitted fluorescent light carries the information, and the reflected laser is filtered out in the read device.

Both Philips Electronics NV and IBM have proposed the concept of multilayer reflective optical discs. The reflected coherent light of the probing laser, however, causes interference and cross talk among different information levels that drastically degrade the emitted signal.

The cost of a single FMD may be higher than that of other storage media, but its cost per gigabyte should be considerably lower, according to C3D. FMDs now in development will hold 140GB of data, as opposed to the 20GB predicted for next-generation DVDs.

C3D is banking on FMD technology becoming the standard in all kinds of small portable appliances and electronic devices. FMD will allow gigabytes of storage on a disc the size and shape of a credit card. C3D expects the technology to revolutionize data storage within five years. It will replace CD and DVD technology and will be used in mobile phones, handheld computers, video recorders, PCs, digital cameras and high-definition TVs.

Some industry analysts note, however, the users interested in enhanced data storage should not plan on tossing out their CD-ROMs and DVDs soon. Other efforts to accelerate the progress of storage technology have promised much—some for many years—but as yet have yielded little.

One of the technologies that has not made it out of the laboratory is blue lasers. With the shorter wavelengths and, subsequently, greater storage capabilities than red lasers, blue lasers would burn smaller pits and cram more bits onto removable data. In the mid 1990s, some trade magazines predicted that blue lasers would be in commercial development by 2000. Even with companies like Sony Corp., 3M Co., Philips and Panasonic Industrial Co. involved in research and development, blue laser devices remain too unwieldy for commercial applications.

The antecedents of holography are not rotating discs but photography and holography. The lure of holography is the density of data that can be saved about 1TB in a crystal the size and shape of a sugar cube. The recording material is a photosensitive crystal, which is illuminated by a reference beam and a signal beam. The resulting interference pattern is recorded in the crystal. Shining a reference beam through the interference pattern returns the original signal beam. Entire pages of data can be restored and read simultaneously. Headdress of the data is the angle and frequency of the reference beam.

3.2 Computer Graphics and Images

3.2.1 Text

Computer graphics is a wonderful invention in the field of computers. It is used in diverse areas such as displaying the results of engineering and scientific computations and visualization, producing television commercials and feature films, simulation and analysis of real world problems, computer aided design, graphical user interfaces the communication bandwidth between humans and machines, etc.[1] The art of creating pictures with a computer has got numerous applications, that it is of great importance to explore the intrinsic of the world of computer graphics.

Graphics Primitives

A primitive is a graphics object that is essential for the creation or construction of complex images. Fortunately, graphics is constructed from three basic elements, as opposed to the great variety of graphics applications. The most basic of these elemental structures is the pixel, short for picture element.

A pixel is a point of light. It is just one tiny dot on the raster displays. Though it has no structure, it is definitely a building block and hence it can be considered as the graphics primitive. The resolution of CRT is related to the dot size, the diameter of a single dot. A resolution of 100 dots/ inch implies a dot size of 0.01 inch. However, in reality, pixels are more elliptic than circle. The shape of a pixel purely depends upon the characteristics of the visual display unit. The ratio of the distance between the centers of two adjacent horizontal pixels to that of the vertical ones is called the pixel ratio.

Lines, especially straight lines, constitute an important building block of computer images. For example, line is the basic building block of Line graphs, bar and pie charts, two and three-dimensional graphs of mathematical functions, engineering drawings and architectural plans. In computer graphics, straight line is so basic in creating images that we call it a graphics primitive. Straight lines can be developed in two different ways. A structural method determines which pixels should be set before drawing the line, a conditional method tests certain conditions to find which pixels should be set next.[2]

A polygon, even though generally constructed from straight lines, is an important graphics primitive. [3] So often we want to handle polygon as a single entity, as images of objects from the real world consist in large part of polygons. A polygon is a closed area of image bounded by straight or curved lines and filled with one solid color. Since images are two dimensional, a polygon is a plane figure.

Implementing a polygon as a graphics primitive is natural and helpful. We can define polygon as an image which consists of a finite ordered set of straight boundaries called edges. Alternately, the polygon can be defined by an ordered sequence of vertices, the corners of the polygon. The edges of the polygon are then obtained by traversing the vertices in the given order. The edge list is sufficient for wire frame drawings. Two consecutive vertices define one edge. We close the polygon by connecting the vertex to the first.

Output Primitives

Typically, graphics programming packages provide functions to describe a scene in terms of these basic geometric structures, referred to as output primitives, and to group sets of output primitives into more complex structures. Each output primitive is specified with input coordinate data and other information about the way that the object is to be displayed. Points and straight-line segments are the simplest geometric components of pictures. Additional output primitives that can be used to construct a picture include circles and other conic sections, quadric surfaces, spline curves and surfaces, polygon color areas, and character strings.

Point plotting is accomplished by converting a single coordinate position furnished by an application program into appropriate operations for the output device in use. With a CRT monitor, for example, the electron beam is turned on to illuminate the screen phosphor at the selected location. How the electron beam is positioned depends on the display technology.

Line drawing is accomplished by calculating intermediate positions along the line path between two specified endpoint positions. An output device is then directed to fill in these positions between

the endpoints. For analog devices, such as a vector pen plotter or a random-scan display, a straight line can be drawn smoothly from one endpoint to the other. Linearly varying horizontal and vertical deflection voltages are generated that are proportional to the required changes in the *x* and *y* directions to produce the smooth line.

Digital devices display a straight-line segment by plotting discrete points between the two endpoints. Discrete coordinate positions along the line path are calculated from the equation of the line. For a raster video display, the line color (intensity) is then loaded into the frame buffer at the corresponding pixel coordinates. Reading from the frame buffer, the video controller then plots the screen pixels. Screen locations are referenced with integer values. This rounding of coordinate values to integers causes lines to be displayed with a stair step appearance (the zigzag). The characteristic stair step shape of raster lines is particularly noticeable on systems with low resolution, and we can improve their appearance somewhat by displaying them on high-resolution systems.[4] More effective techniques for smoothing raster lines are based on adjusting pixel intensities along the line paths.

To load a specified color into the frame buffer at a position corresponding to column x along scan line *y*, we will assume we have available a low-level procedure of the form

SetPixel (*x*, *y*)

We sometimes will also want to be able to retrieve the current frame-buffer intensity setting for a specific location. We will accomplish this with the low-level function

GetPixel (*x*, *y*)

Digital Images

The term digital image processing generally refers to processing of a two-dimensional picture by a digital computer. In a broader context, it implies digital processing of any two-dimensional data. A digital image is an array of real or complex numbers represented by a finite number of bits. An image given in the form of a transparency, slide, photograph, or chart is first digitized and stored as a matrix of binary digits in computer memory.[5] This digitized image can then be processed and/or displayed on a high resolution television monitor.

For display, the image is stored in a rapid-access buffer memory which refreshes the monitor at 30 frames/s to produce a visibly continuous display. Mini/micro-computers are used to communicate and control all the digitization, storage, processing, and display operations via a computer network (such as the Ethernet). Program inputs to the computer are made through a terminal, and the outputs are available on a terminal, television monitor, or a printer/plotter.

Digital image processing has a broad spectrum of applications, such as remote sensing via satellites and other spacecrafts, image transmission and storage for business applications, medical processing, radar, sonar, and acoustic image processing, robotics, and automated inspection of industrial parts.

Images acquired by satellites are useful in tracking of earth resources; geographical mapping; prediction of agricultural crops, urban growth, and weather; flood and fire control; and many other environmental applications. Space image applications include recognition and analysis of objects

contained in images obtained from deep space-probe missions. Image transmission and storage applications occur in broadcast television, teleconferencing, transmission of facsimile images (printed documents and graphics) for office automation, communication over computer networks, closed-circuit television based security monitoring systems, and in military communications. Radar and sonar images are used for detection and recognition of various types of targets or in guidance and maneuvering of aircraft or missile systems. There are many other applications ranging from robot vision for industrial automation to image synthesis for cartoon making or fashion design. In other words, whenever a human or a machine or any other entity receives data of two or more dimensions, an image is processed.

Key Words

acoustic	听觉的，声学的
adjust	调整，校正
appearance	外观，出场
broadcast	散播的，广泛散步的
conic	圆锥曲面
consecutive	连续的，依次相续的
constitute	构成，组成，设立
coordinate	协调的，配合的，坐标的
diameter	直径
digitization	数字化
elliptic	椭圆形的
endpoint	终点
facsimile	传真，复制，摹本
horizontal	水平的
intrinsic	本质的，真正的
mission	使命，任务
noticeable	注意，认识，通知
numerous	很多的，多数的
phosphor	荧光
pixel	像素
plotter	绘图仪
polygon	多边形
primitive	元素，原始的
quadric	二次曲面
raster	光栅
refresh	刷新
resolution	分辨率
satellite	卫星
scene	场景，布景

slide	幻灯片，滑面，载片
sonar	声纳
spectrum	谱，光谱，范围
synthesis	合成，综合
transparency	投影胶片，透明装饰
vertex（复数 vertices）	顶点，最高点
vertical	垂直的，纵向的
visualization	可见性，形象化
voltage	电压
zigzag	锯齿

Notes

[1] It is used in diverse areas such as displaying the results of engineering and scientific computations and visualization, producing television commercials and feature films, simulation and analysis of real world problems, computer aided design, graphical user interfaces the communication bandwidth between humans and machines, etc.

这是一个典型的长句，主句是“It is used in diverse areas”，其后的部分作宾语补足语。

译文：它应用于不同领域，如演示工程和科学计算及可视化的结果，制作电视广告和特色电影，现实世界问题的模拟和分析，计算机辅助设计，增加人机间通信带宽的图形用户接口等。

[2] A structural method determines which pixels should be set before drawing the line, a conditional method tests certain conditions to find which pixels should be set next.

这是一个并列句，每部分讲述一种方法，前部分的“which pixels should be set before drawing the line”是宾语从句；后部分的“to find which pixels should be set next”作宾语补足语。

译文：结构方法是在画线之前决定像素的位置，条件方法是先验证一定的条件从而再决定像素的位置。

[3] A polygon, even though generally constructed from straight lines, is an important graphics primitive.

本句中的“even though generally constructed from straight lines”作非限定性定语。

译文：多边形，尽管通常由直线组成，但它也是重要的图形元素。

[4] The characteristic stair step shape of raster lines is particularly noticeable on systems with low resolution, and we can improve their appearance somewhat by displaying them on high-resolution systems.

本句是并列句，在前部分，“The characteristic stair step shape”是主语，“raster lines”作定语；后部分中，“we”是主语，“by displaying them on high-resolution systems”是方式状语。

译文：光栅线的这种特有的阶梯现象在低分辨率的系统上特别明显，我们可以通过使用高分辨率显示系统来改善这一点。

[5] An image given in the form of a transparency, slide, photograph, or chart is first digitized and stored as a matrix of binary digits in computer memory.

本句是被动句，“given in the form of a transparency, slide, photograph, or chart”是定语，修饰主语“image”，“is first digitized and stored”是谓语。

译文：以投影胶片、幻灯片、照片或绘图方式给定的图像首先要进行数字化，再以二进制数字阵列形式存储在计算机存储器内。

3.2.2 Exercises

1．Translate the following phrases into English

（1）数学函数

（2）几何结构

（3）饼图

（4）帧缓冲器

（5）视频显示器

（6）电子束

（7）数字图像

（8）像素比

2．Translate the following phrases into Chinese

（1）integer value

（2）straight line

（3）industrial automation

（4）curved line

（5）three-dimensional graph

（6）low-level procedure

（7）output primitive

（8）closed-circuit television

3．Identify the following to be True or False according to the text

（1）The polygon can be defined by an ordered sequence of vertices, the corners of the polygon.

（2）A pixel is a point of light.

（3）Discrete coordinate positions along the line path are calculated from the equation of the line.

（4）Implementing a polygon as a graphics primitive is natural and helpful.

（5）How the electron beam is positioned depends on the storage technology.

（6）A primitive is a graphics object that is essential for the creation or construction of simple images.

（7）Images acquired by satellites are not useful in tracking of earth resources.

（8）A digital image is an array of real or complex numbers represented by a infinite number of bits.

4．Reading Comprehension

（1）_____images are used for detection and recognition of various types of targets or in guidance and maneuvering of aircraft or missile systems.

a．Application

b．Only radar

c．Only sonar

d. Radar and sonar

（2）Digital devices display a _____segment by plotting discrete points between the two endpoints.

a. polygon

b. chart

c. straight-line

d. curved-line

（3）Point plotting is accomplished by converting a single coordinate position furnished by an application program into appropriate operations for the _____in use.

a. device

b. output device

c. input device

d. input/output device

（4）We can define_____as an image which consists of a finite ordered set of straight boundaries called edges.

a. polygon

b. line

c. pixel

d. chart

3.2.3 Reading Material

Image File Formats

Image file formats provide a standardized method of organizing and storing image data. Image files are made up of either pixels or vector data. Image compression is a method of using algorithms to decrease file size. There are many image file formats, for example, JPEG, PGF, TIFF, GIF and BMP.

The JPEG (Joint Photographic Experts Group) standard was developed by photographic experts working under the joint venture of ITU, ISO, and other standards body. Nearly all digital cameras have the option to save images in JPEG format. The JPEG files do suffer stepwise degradation when repeatedly edited and saved. Photographic images are best stored in a lossless non-JPEG format if they will be re-edited in future, or if the presence of small “artifacts”, due to the nature of the JPEG compression algorithm, is unacceptable. JPEG is also used as the compression algorithm in many Adobe PDF files.

The PGF (Progressive Graphics File) is a newly introduced wavelet-based bitmapped image format. PGF was created to improve upon and replace the JPEG format. It was developed at the same as JPEG 2000.

The TIFF (Tagged Image File Format) is a file format for storing images, including photographs and line art. TIFF is a popular format for high color depth images, along with JPEG and PNG. It is a flexible and adaptable file format. It can handle multiple images and data in a single file through the

inclusion of “tags” in the file header.

The GIF (Graphic Interchange Format) is limited to an 8 bit palette, or 256 colors. It is well-suited for more simple images such as graphics or solid areas of color. The GIF format supports animation and is still widely used to provide image animation effects.

The BMP (Bit MaPped) format is used internally in the Microsoft Windows operating system to handle graphics images. The main advantage of BMP files is their wide acceptance, simplicity, and use in Windows programs. BMP images are suitable for background images and wallpapers.

The MPEG (Moving Picture Experts Group) standards are the main algorithms used to compress videos and have been international standards since 1993. It is the name of the family of standards used for coding audio-visual information (e.g., movies, video, and music) in a digital compressed format. The major advantage of MPEG compared to other video and audio coding formats is that MPEG files are much smaller. The major MPEG standards include the following.

MPEG-1: Its goal is to produce video recorder-quality output using a bit rate of 1.2 Mbps. It can be transmitted over twisted pair transmission lines for modest distances, and also used for storing movies on CD-ROM in CD-I and CD-Video format.

MPEG-2: It was originally designed for compressing broadcast quality video into 4 to 6 Mbps, so it could fit in a NTSC or PAL broadcast channel. It is a standard for “the generic coding of moving pictures and associated audio information”. MPEG-2 is a superset of MPEG-1, with additional features, frame formats and encoding options.

MPEG-3: It supports higher resolutions, including HDTV.

MPEG-4: It is an ISO/IEC standard developed by MPEG, the committee that also developed the Emmy Award winning standards known as MPEG-1 and MPEG-2. It is for medium-resolution video-conferencing with low frame rates and at low bandwidths. MPEG-4 files are smaller than JPEG or QuickTime files, so they are designed to transmit videos and images over a narrower bandwidth and can mix video with text, graphics and 2D and 3D animation layers.

MPEG-7: It is the multimedia standard for the fixed and mobile web, enabling integration of multiple paradigms. MPEG-7 is formally called multimedia content description interface. It provides a tool set for completely describing multimedia content and is designed to be generic and not targeted to a specific application.

MPEG-21: Unlike other MPEG standards that describe compression coding methods, MPEG-21 describes a standard that defines the description of content and also processes for accessing, searching, storing and protecting the copyright of content.

3.3 Computer Aided Design

3.3.1 text

In the broadest sense, Computer Aided Design (CAD) refers to any application of a computer to the solution of design problems, the engineer may communicate with the computer in many forms, either via the visual display screen, keyboard, graph plotter or many more man-machine interfaces. They can ask a question and receive an answer from the computer in a matter of seconds. More

specifically, CAD is a technique in which the engineer and a computer work together as a team, utilizing the best characteristics of each.[1]

In the past, the conventional tools of the engineer in his/her role as a designer, have been drawing boards and instruments, calculators and technical data sheets. More recently, the advent of the computer caused major changes in industry. The first real progress in the use of computers in the manufacturing process came in the late 1950s with the introduction of numerical controlled (NC), and later computer numerical controlled (CNC), machine tools. Data supplied to the machines, on tape, controlled the motions of the tools that produced the parts of an assembly. There was no direct link to the designer other than drawings and tables of values.

An important change came with the introduction of CAD in the early 1960s. CAD allowed the designer to interact graphically with the computer, and enables the engineer to test a design idea and to rapidly see its effect, the design idea can then be modified and reassessed. The process being repeated until a good design is achieved. Following each iteration, the design solution hopefully improves. Therefore, the more cycles that can be carried out within the financial, material and time constraints, the better the result should be.

The computer can be exploited to speed up and improve the accuracy of the design process. It will perform large numbers of complicated calculations in a very short space of time and will produce results which are accurate and reliable. This foregoing feature of the computer proves invaluable in its role as a design aid as the number of calculations required by some designs could simply not be performed by man in a reasonable time.[2]

CAD relies upon the use of a cathode-ray tube (television display) hooked to a computer. The technician feeds descriptions of his or her design into the computer by means of a typewriter keyboard, a light pen, or a similar input device. He or she then commands the computer to alter the drawing in certain specific ways, such as adding or deleting lines. At any point the designer can command the computer to simulate the real-world behavior of the part being created. For instance, the designer can determine how it will behave under stress or how heat will flow through it if it is exposed to the sun or subjected to friction.[3] Moreover, the designer can use the light pen to modify the design in a variety of ways to obtain improved performance. Each time a change is made, the computer is commanded to make a new evaluation.

CAD is so effective because the computer communicate with the designer not with numbers but pictures, which are much easier for the human mind to absorb. The methodology also permits the simulated testing and evaluation of the components being designed. The test results are superimposed, pictorially or numerically, on the television screen. If, for instance, the model is being heated, portions of it will be tinted in different colors each representing a specific temperature range. This powerful pictorial representation helps the designer visualize exactly what is taking place. Contrast this with the slow, laborious, often frustrating process of attempting to extract the same information from a 500-page alphanumeric printout.

The driving force behind the provision of computer assistance for conventional modeling techniques has been the desire to improve the productivity of the designer by the automation of the more repetitive and tedious aspects of design, and also to improve the precision of the design models.

New techniques have been developed in an attempt to overcome perceived limitations in conventional practice—particularly in dealing with complexity—for example in the complexity of form of some design such as automobile bodies, or the intricacy of structure of products such as integrated circuits. CAD should therefore enable the designer to tackle a task more quickly and accurately, or in a way that could not be achieved by other means.

CAD should involve the development of a central design description on which all applications in design and manufacture should feed. This implies that computer-based techniques for the analysis and simulation of the design, and for the generation of manufacturing instructions, should be closely integrated with the techniques for modeling the form and structure of the design. In addition, a central design description forms an excellent basis for the concurrent development of all aspects of a design in simultaneous engineering activities. In principle, CAD could be applied throughout the design process, but in practice its impact on the early stages, where very imprecise representation such as sketches are used extensively, has been limited. It must also be stressed that at present CAD does not help the designer in the more creative parts of design, such as the generation of possible design solutions, or in those aspects that involve complex reasoning about the design. For example in assessing by visual examination of drawings whether a component may be made, or whether it matches the specification. These aspects are, however, the subjects of considerable current research.

The computer is capable of holding vast quantities of information on permanent media such as magnetic disc or temporarily in immediate access store. It is therefore possible to represent the details of an engineering drawing or the shape of a car body in digital form and store this digital information in memory. This data can then be retrieved from memory, rapidly converted and displayed on a VDU graphics screen, or alternatively, plotted onto paper using a graph plotter. Besides, the designer can quickly and easily update or amend any part of the drawing. The drawing data can then be written back to memory in its updated form.

The function of CAD can be grouped into four different categories:

1. Design and geometric modeling
2. Engineering analysis
3. Kinematics
4. Drafting

In design and geometric modeling the engineer describes the basic shape of the component he or she is intending to make, and the computer converts these inputs into a mathematical model that it stores for later use.[4] Once the model has been created, the engineering analysis performed by the computer determines such fundamental parameters as weight, volume, structural strength, heating behavior, electrical conductivity, and so forth. With computer-simulated kinematics the user can determine whether or not the moving parts or other structures will interfere with the motion of the component being designed.[5] Finally, drafting routines are used to provide drawings and other pictorial representations for the manufacture of the desired component.

The general CAD system was developed by considering a wide range of possible uses of such a system. The following were considered in detail:

- Mechanical engineering design

- Building design
- Structural engineering design
- Electronic circuit design
- Animation and graphic design

It was thought that for most practical applications the general drawing system would be incorporated in a much larger specific applications system. For this reason the drawing system was as simple as possible consistent with reasonable running efficiency, so that it could be incorporated into an application system with the minimum of effort.

For both the production of drawing items by analysis and the analysis of drawings, it is essential that there is a simple efficient link between data produced by the drawing system and analysis programs. It is also essential that graphic data can be annotated in a way which is recognized by analysis programs but which does not affect the drawing system.

Key Words

absorb	吸收
amend	修改，改善
cathode	阴极
evaluation	评价，评估
extensively	广泛地
foregoing	前述的，先前的
friction	摩擦
frustrate	挫败，击败
graphically	图形地
intricacy	纷乱，错杂
invaluable	无价的，价值无法衡量的
iteration	重复
kinematics	运动学
laborious	艰苦的，勤劳的
pictorially	绘图地，形象地
portion	部分
provision	准备，供应
reassess	再评价
repetitive	重复性
sketch	草图，描绘略图
tackle	处理
tedious	沉闷的，冗长的

Notes

[1] More specifically, CAD is a technique in which the engineer and a computer work together as a team, utilizing the best characteristics of each.

“in which…”是一个介词前置的限定性定语从句，修饰和限定“a technique”。

译文：更确切地说，CAD 是使工程技术人员和计算机协同工作，彼此发挥长处的技术。

[2] This foregoing feature of the computer proves invaluable in its role as a design aid as the number of calculations required by some designs could simply not be performed by man in a reasonable time.

“as a design aid”为主句中的状语；“as the number of…”则为原因状语从句，从句中的过去分词短语“required by some designs”作定语，修饰“calculations”。

译文：由于在有限的时间内某些设计所需要的大量计算不能简单地由人来完成，计算机的上述特征证明其作为一个设计工具的作用是无法估价的。

[3] For instance, the designer can determine how it will behave under stress or how heat will flow through it if it is exposed to the sun or subjected to friction.

由“how”引导的两个并列从句作本句的宾语，“if it is exposed to the sun or subjected to friction”是条件状语从句。

译文：例如，设计师可以确定在一定压力下部件的工作状况，或者暴露在阳光下或承受摩擦时热量将如何流动。

[4] In design and geometric modeling the engineer describes the basic shape of the component he or she is intending to make, and the computer converts these inputs into a mathematical model that it stores for later use.

本句中的“In design and geometric modeling”作状语，由“and”引导两个并列句子，主语分别是“the engineer”和“the computer”。

译文：在设计和几何造型阶段，工程师描述将要制造的零件的基本形状，计算机把这些输入信息转换成数学模型，并将它存储起来供以后使用。

[5] With computer-simulated kinematics the user can determine whether or not the moving parts or other structures will interfere with the motion of the component being designed.

本句的“With computer-simulated kinematics”作状语，“whether or not…”是宾语从句。

译文：借助于计算机模拟运动学分析，设计人员可以确定运动部件或其他结构是否会干扰正在设计的零件的运动。

3.3.2 Exercises

1．Translate the following phrases into English

（1）绘图板

（2）计算机数字控制的

（3）复杂计算

（4）光笔

（5）现实世界行为

（6）阴极射线管

（7）人机界面

（8）工程制图

2．Translate the following phrases into Chinese

（1）digital form

（2）manufacturing process

（3）time constraint

（4）test results

（5）conventional modeling technique

（6）manufacturing instruction

（7）building design

（8）electronic circuit design

3．Identify the following to be True or False according to the text

（1）An important change came with the introduction of CAD in the early 1950s.

（2）The first real progress in the use of computers in the manufacturing process came in the late 1960s.

（3）The computer can be exploited to speed up and improve the accuracy of the design process.

（4）CAD does not rely upon the use of a cathode-ray tube hooked to a computer.

（5）CAD should therefore enable the designer to tackle a task more quickly and accurately.

（6）At present CAD helps the designer in the more creative parts of design.

（7）The computer is capable of holding vast quantities of information on permanent media.

（8）It was thought that for most practical applications the general drawing system would be incorporated in a much larger specific applications system.

4．Reading Comprehension

（1）_____ refers to any application of a computer to the solution of design problems.

a．Computer Aided Design

b．Communication

c．Artificial Intelligence

d．Multimedia

（2）_____, the conventional tools of the engineer in his/her role as a designer, have been drawing boards and instruments, calculators and technical data sheets.

a．In 1990s

b．In the past

c．In the future

d．In nowadays

（3）At any point the designer can command the _____to simulate the real-world behavior of the part being created.

a．CAD

b．interface

c．computer

d．display

（4）Computer aided design is so effective because the computer communicate with the _____not with numbers but pictures.

a．program

b. computer
c. display
d. designer

3.3.3 Reading Material

Introduction to CAM

The primary goal of engineering is to transform ideas into products that are economical and reliable. The process of designing and introducing a part to manufacturing often involves a sizable investment and draws on various disciplines and resources. Engineering is an important key to product design, product manufacturing flow, and the ability of a company to produce good products. Product design determines the function, appearance, cost of production, and ability to plan and control manufacturing operations.

Engineering design has been influenced heavily by the CAD technology and tools available to designers. Similarly, manufacturing has undergone major changes with the introduction of numerically controlled (NC) and computer numerically controlled (CNC) machine tools. These replace conventional machines, thus offering increased flexibility, superior accuracy, and shorter production cycles. Machining of complex (sculptured) surfaces with conventional machining is neither economical nor accurate. These surfaces are found in a wide range of components including those for aircrafts, automobiles, construction and agricultural equipments, machine tools themselves, appliances, cameras, and instrument cases.

The potential benefits of integrating engineering and manufacturing are well recognized. More specifically, full integration of CAD and CAM is an important aspect of factory automation.

Historically, CAD/CAM integration began with the development of the NC technology. NC machine tools have been improving steadily in both areas of hardware control and software developments. NC part programming and interactive computer graphics have contributed heavily to these developments. The integration of CAD and CAM places increasing emphasis on tools and paths for NC machines. It is interesting to note how independent developments (CAD and CAM) which began at completely opposite ends of the CAD/CAM spectrum during evolution of CAD/CAM systems have gradually approached each other. Manufacturing of products draws on different resources such as people, machinery, and equipment. A manufacturing system can be defined as a combination of people, machinery, and equipment which is constrained by material and information flow. Manufacturing systems can be classified into discrete part manufacturing and continuous process manufacturing.

Manufacturing procedures vary from transfer line techniques for high-volume production to job shop procedures for low-volume items. Manufacturing systems can be classified into the following systems.

1. Transfer line. This represents the oldest type of manufacturing systems. Transfer lines are very efficient for mass production (large volumes at a high output rate). They represent what is sometimes called hard automation. They are suitable for manufacturing identical parts. Thus, they

are inflexible and cannot tolerate variations in part design. Any change in part design requires the line to shut down and be retooled. Moreover, if drastic changes in part design occur, the line becomes obsolete.

2. Special manufacturing system. This system together with the next two systems represent the various types of CIM (Computer Integrated Manufacturing) systems. This system is the least flexible while a manufacturing cell is the most flexible. The system is suitable to produce a very limited number of different parts and a medium production rate per part. The system is configured in a similar way to transfer lines; thus only limited changes in the system are possible.

3. Flexible manufacturing system (FMS). A mid-volume, mid-variety production range is covered by this system. Most of the system activities and coordination are done automatically under computer control. Work parts are automatically loaded at central locations on to the handling system (pallets) and are routed to the proper machine tools. The computer job in an FMS includes the control of machine tools and the material handling system, monitoring the performance of the system, and scheduling production. FMSs are not totally under computer control. Humans and human labor are needed to set up machine tools for production, that is, load and unload work-parts, prepare and change tools, and perform initial settings of machine tools.

4. Manufacturing cell. This is the most flexible CIM system. It has the lowest production rate of the three types (system 2, 3, and 4 presented here). A manufacturing cell typically contains many stand-alone machine tools and robots.

5. Stand-alone and NC machines. These machines are highly flexible. Their production rates are too slow due to tool setting-up time and tool changes. They are highly programmable and can deal with product changeovers and part design changes. They are appropriate for job shop and small batch manufacturing.

3.4 Computer Animation

3.4.1 Text

Some typical applications of computer-generated animation are entertainment (motion pictures and cartoons), advertising, scientific and engineering studies, and training and education. Although we tend to think of animation as implying object motions, the term computer animation generally refers to any time sequence of visual changes in a scene.[1] In addition to changing object position with translations or rotations, a computer-generated animation could display time variations in object size, color, transparency, or surface texture. Advertising animations often transfer one object shape into another. For example, transforming a can of motor oil into an automobile engine. Computer animations can also be generated by changing camera parameters, such as position, orientation, and focal length. And we can produce computer animations by changing lighting effects or other parameters and procedures associated with illumination and rendering.

Many applications of computer animation require realistic displays. An accurate representation of the shape of a thunderstorm or other natural phenomena described with a numerical model is important for evaluating the reliability of the model also, simulators for training aircraft pilots and

heavy-equipment operators must produce reasonably accurate representations of the environment. Entertainment and advertising applications on the other hand, are sometimes more interested in visual effects. Thus, scenes may be displayed with exaggerated shapes and unrealistic motions and transformations. There are many entertainment and advertising applications that do require accurate representations for computer-generated scenes. And in some scientific and engineering studies, realism is not a goal. For example, physical quantities are often displayed with pseudo-colors or abstract shapes that change over time to help the researcher understand the nature of the physical process.

Design process of animation

In general, a sequence is designed with the following steps:

- Storyboard layout
- Object definitions
- Key-frame specifications
- Generation of in-between frames

This standard approach for animated cartoons is applied to other animation applications as well, although there are many special applications that do not follow this sequence. Real-time computer animations produced by flight simulators, for instance, display motion sequences in response to settings on the aircraft controls.[2] And visualization applications are generated by the solutions of the numerical models. For frame-by-frame animations, each frame of the scene is separately generated and stored. Later, the frame can be recorded on film or they can be consecutively displayed in “real-time playback” mode.

The storyboard is an outline of the action. It defines the motion sequence as a set of basic events that are to take place. Depending on the type of animation to be produced, the storyboard could consist of a set of rough sketches or it could be a list of the basic ideas for the motion.[3]

An object definition is given for each participant in the action. Object can be defined in terms of basic shapes, such as polygons or splines. In addition, the associated movements for each object are specified along with the shape.

A key frame is a detailed drawing of the scene at a certain time in the animation sequence. Within each key frame, each object is positioned according to the time for that frame. Some key frames are chosen at extreme positions in the action; others are spaced so that the time interval between key frames is not too great. More key frames are specified for intricate motions than for simple, slowly varying motions.

In-betweens are the intermediate frames between the key frames. The number of in-betweens needed is determined by the media to be used to display the animation. Film requires 24 frames per second, and graphics terminals are refreshed at the rate of 30 to 60 frames per second. Typically, time intervals for the motion are set up so that there are from three to five in-betweens for each pair of key frames.[4] Depending on the speed specified for the motion, some key frames can be duplicated. For a 1-minute film sequence with no duplication, we would need 1440 frames. With five in-betweens for each pair of key frames, we would need 288 key frames. If the motion is not too

complicated, we could space the key frames a little farther apart.[5]

There are several other tasks that may be required, depending on the application. They include motion verification, editing, and production and synchronization of a soundtrack. Many of the functions needed to produce general animations are now computer-generated.

Some steps in the development of an animation sequence are well suited to computer solution, these include object manipulations and rendering, camera motions, and the generation of in-betweens. Animation packages, such as Wave-front, for example, provide special functions for designing the animation and processing individual objects.

One function available in animation packages is provided to store and manage the object database. Object shapes and associated parameters are stored and updated in the database. Other object functions include those for motion generation and those for object rending. Motions can be generated according to specified constraints using two-dimensional or three-dimensional transformations. Standard functions can then be applied to identify visible surfaces and apply the rendering algorithms.

Another typical function simulates camera movements. Standard motions are zooming, panning, and tilting. Finally, given specification for the key frames, the in-betweens can be automatically generated.

Making movie clips with Flash

Standard Flash work environment includes menu bar, tool bar, stage, time-axis window, and tool palette. Besides these several major parts, with Windows menu opened, some small windows like material window can be called on.

Work area refers to a Flash work platform; it is a rather big area, actually covering all stages as mentioned below and work objects for drawing pictures or editing movie clips. It can be seen as combination of backstage and stage.

Stage is a platform for demonstrating all elements of Flash movie clip, displaying the content of the currently selected frame. Different from work area, only the content of stage is visible after the movie clip is played back, while content in the work area beyond the stage is invisible, just like players and work staffs in the backstage which are invisible to the audience. Just like drama having several scenes, the stage can have several scenes. Note, on the upper right part of the stage, there are two small buttons; of them, the first one is a button for switching scenes. With interactivity between different scenes, very complex work can be created.

The time-axis window is for performing operations on two Flash basic element layers and frames. In default system configuration, the time-axis window appears above the stage, close to the upper border, in a form of editing bar. It is possible to drag the editing bar with the mouse to other positions of Flash interface, or even outside the border, to make it a freely floating window, depending on the user’s need or favorite choice. Time-axis control window is divided into left and right areas used as layer control area and as time-axis control area, respectively.

Using layers, it is possible to stack elements of movie clip one upon another orderly. The layer control area is at the left section of the time-axis window; it is a major area for layer demonstration

and operation, consisted of several illustrative bars and buttons for layer functional operations. Name, type and state of all layers of current work being edited in the stage are all queued in an illustrative bar, in a same order as layers are placed. In the layer control area, not only are displayed the layers and relevant information of current work, but also operations on one or more layers, including adding layers, deleting layers and rearranging their order, etc. The right section of the time-axis window is the time-axis control area, control several lines corresponding to the sequence of frames at the left layer, illustrative bars, time ruler, information prompt bar, as well as tool buttons for controlling playing back and operation of movie clip. It is used for effective control on playing back and placing frames.

Key Words

animation	动画
backstage	后台，幕后
cartoon	卡通
drama	剧本，戏剧
entertainment	娱乐，游艺
focal	焦点的
illumination	照明，照明度
illustrative	说明性质的
intricate	错综的，复杂的
manipulation	操纵，控制，操作
orientation	定位，定向
outline	大纲，提纲
phenomenon	现象，事件
prompt	迅速的，及时的
render	表现，描写，反映
rotation	旋转，轮转
simulator	模拟器，仿真器
soundtrack	音带，声迹
staff	工作人员
storyboard	故事情节，剧本
synchronization	同步，同时性
thunderstorm	雷雨
verification	证实，验证

Notes

[1] Although we tend to think of animation as implying object motions, the term computer animation generally refers to any time sequence of visual changes in a scene.

本句由“although”引导让步状语从句。

译文：尽管我们在考虑动画时倾向于想到暗指对象的移动，但术语“计算机动画”通常指

场景中任何随时间而发生的视觉变化。

[2] Real-time computer animations produced by flight simulators, for instance, display motion sequences in response to settings on the aircraft controls.

本句的“produced by flight simulators”作定语，修饰主语，“for instance”是插入语，“to settings on the aircraft controls”作目的状语。

译文：例如，飞行模拟器生成的实时计算机动画按飞机控制器上的动作来显示动画序列。

[3] Depending on the type of animation to be produced, the storyboard could consist of a set of rough sketches or it could be a list of the basic ideas for the motion.

本句的“Depending on the type of animation to be produced”是分词结构作状语，其后是并列句。

译文：依赖于要生成的动画类型，剧本可能包含一组粗略的草图或运动的一系列基本思路。

[4] Typically, time intervals for the motion are set up so that there are from three to five in-betweens for each pair of key frames.

本句由“so that”引导目的状语从句。

译文：一般情况下，运动的时间间隔设定为每一对关键帧之间有 3~5 个插值帧。

[5] If the motion is not too complicated, we could space the key frames a little farther apart.

本句由“if”引导条件状语从句，“a little farther apart”作宾语补足语。

译文：如果运动并不是很复杂，我们可以将关键帧安排得稀一点。

3.4.2 Exercises

1．Translate the following phrases into English

（1）数字模型

（2）工作区

（3）时间间隔

（4）实时回放

（5）伪彩色

（6）效果控制

（7）关键帧

（8）时间轴标尺

2．Translate the following phrases into Chinese

（1）layer control area

（2）in-between frame

（3）aircraft pilot

（4）time-axis window

（5）animation sequence

（6）physical process

（7）tool button

（8）backstage and stage

3．Identify the following to be True or False according to the text

（1）The storyboard is a real-time description of the action.

（2）An object definition is given for a part of participant in the action.

（3）Many applications of computer animation require realistic displays.

（4）More key frames are specified for intricate motions than for simple, slowly varying motions.

（5）Standard Flash work environment does not include time-axis window and tool palette.

（6）A key frame is a detailed drawing of the scene at a certain time in the animation sequence.

（7）Entertainment and advertising applications are more interested in textual effects.

（8）The standard approach for animated cartoons is applied to other animation applications.

4．Reading Comprehension

（1）For a 1-minute film sequence with no duplication, we would need_____frames.

a．640

b．720

c．2880

d．1440

（2）Film requires _____ per second, and graphics terminals are refreshed at the rate of 30 to 60 frames per second.

a．42 frames

b．36 frames

c．24 frames

d．20 frames

（3）The_____window is for performing operations on two Flash basic element layers and frames.

a．tool

b．time-axis

c．time

d．layer

（4）Using_____, it is possible to stack elements of movie clip one upon another orderly.

a．tool bar

b．animation sequence

c．time-axis window

d．layers

3.4.3 Reading Material

Online Games

Online games refer to video games that are played over some form of computer network, most commonly the Internet. The expansion of online gaming has reflected the overall expansion of computer networks from small local networks to the Internet and the growth of Internet access itself. Online games can range from simple text based games to games incorporating complex graphics and

virtual worlds populated by many players simultaneously. Many online games have associated online communities, making online games a form of social activity beyond single player games.

The rising popularity of Flash and Java led to an Internet revolution where websites could utilize streaming video, and a whole new set of user interactivity. When Microsoft began packaging Flash as a pre-installed component of IE, the Internet began to shift from a data/information spectrum to also offer on-demand entertainment. This revolution paved the way for sites to offer games to web surfers. Many games like Club Penguin, World of Warcraft, Final Fantasy Ⅺ and Lineage Ⅱ, charge a monthly fee to subscribe to their service. Many other sites relied on advertising revenues from on site sponsors, while others, like RuneScape, let people play for free while leaving the players the option of playing, unlocking new skills for the members.

After the dot-com bubble burst in 2001, many sites solely relying on advertising revenue dollars faced extreme adversity. Despite the decreasing profitability of online gaming websites, some sites have survived the fluctuating ad market by offsetting the advertising revenue loss by using the content as a cross-promotion tool for driving web visitors to other websites that the company owns.

Online games started in the 1980s with MUDs, simple multiplayer text-based games, often played on a BBS using a modem. These games were frequently based on fantasy settings, using rules similar to those in the role-playing game (RPG) Dungeons & Dragons. Other styles of games, such as chess, Scrabble clones and other board games were available. Since continuous connectivity was often expensive as access was frequently charged on a per-minute basis, some games were set up as play-by-E-mail games.

During the 1990s, online games started to move from a wide variety of LAN protocols and onto the Internet using the TCP/IP protocol. Doom popularized the concept of death-match, where multiple players battle each other head-to-head, as a new form of online game.

As consoles are becoming more like computers, online game play is expanding. Once online games started crowding the market, open source networks, such as the Playstation 2, Dreamcast and Gamecube took advantage of online functionality with its PC game counterpart.

As the World Wide Web developed and browsers become more sophisticated, people started creating browser games that used a web browser as a client. Simple single player games were made that could be played using a web browser via HTML and HTML scripting technologies. More complicated games would contact a web server to allow a multiplayer gaming environment.

The development of web-based graphics technologies such as Flash and Java allowed browser games to become more complex. These games, also known by their related technology as “Flash games” or “Java games”, became increasingly popular. Many games originally released in the 1980s, such as Pac-Man and Frogger, were recreated as games that could be played using the Flash plug-in on a webpage. Most browser games have limited multiplayer play, often being single player games with a high score list shared amongst all players.

Browser-based pet games are also very popular amongst the younger generation of online gamers. These games range from gigantic games with millions of users, such as Neopets to smaller and more community-based pet games. More recent browser-based games use web technologies like AJAX to make more complicated multiplayer interactions possible.

Massively multiplayer online games were made possible with the growth of broadband Internet access in many developed countries, using the Internet to allow hundreds of thousands of players to play the same game together.

3.5 Multimedia Software

3.5.1 Text

Dreamweaver

Macromedia Dreamweaver is a professional HTML editor for visually designing and managing web sites and pages. Whether you enjoy the control of hand-coding HTML or prefer to work in a visual editing environment, Dreamweaver makes it easy to get started and provides you with helpful tools to enhance your Web design experience.

Dreamweaver includes many coding tools and features: an HTML, CSS, and JavaScript reference, a JavaScript debugger, and code editors that allow you to edit JavaScript, XML, and other text documents directly in Dreamweaver. Macromedia's Roundtrip HTML technology imports HTML documents without reformatting the code and you can set Dreamweaver to clean up and reformat HTML when you want it to.

Dreamweaver's visual editing features also let you quickly add design and functionality to your pages without writing a line of code. You can view all your site elements or assets and drag them from an easy-to-use panel directly into a document. Streamline your development workflow by creating and editing images in Macromedia Fireworks, then importing them directly into Dreamweaver, or by adding Flash objects you create directly in Dreamweaver.

Dreamweaver is fully customizable. Use Dreamweaver to create your own objects and commands, modify keyboard shortcuts, and even write JavaScript code to extend Dreamweaver's capabilities with new behaviors, property inspectors, and site reports.

Dreamweaver can display a document in three ways: in Design view, in Code view, and in a split view that shows both the design and code. To change the view in which you are working, select a view in the Dreamweaver toolbar.[1] By default, Dreamweaver displays the document window in design view.

In addition, you can work with Dreamweaver's design view in two different ways in layout view and standard view. You select these views in the view category of the objects panel. In layout view you can design a page layout, insert graphics, text, and other media; in standard view, in addition to inserting graphics, text and media, you can also insert layers, create frame documents, create tables, and apply other changes to your page-options that are not available in layout view.

Adobe Photoshop

Adobe Photoshop is a kind of photo retouching, image editing, and color painting software. Whether you are a novice or an expert in image editing, the Photoshop program offers you the tools you need to get professional-quality results.[2]

Photoshop provides integrated tools for creating and outputting crisp, editable vector shapes and text. With the new tools, you can incorporate resolution-independent, vector-based graphics and type into pixel-based images to achieve an unparalleled range of design effects.

The new rectangle, rounded rectangle, ellipse, polygon, and line tools let you create a wide variety of vector-based shapes. These tools can be used to create shape layers. Like Adobe Illustrator, Photoshop provides pathfinder operations—Add, Subtract, Restrict, and Invert—for quickly combining basic vector shapes into complex shapes.

With Photoshop, you can easily combine crisp, resolution-independent type with pixel-based images, and then output sharp type edges with your image to produce high-quality results. What's more, Photoshop includes extensive new type formatting controls to help you produce the best-looking text possible, including the new type-warping that lets you twist and pull type to produce cool effects. Best of all, the type remains directly editable in the image no matter how you manipulate it.

Photoshop presents an intuitive new layer effects interface, a new selection of effect options, and new support for saving your layer effect designs as layer styles for ongoing use. The new Layer Styles dialog box shows at a glance which effects are applied to the currently selected layer and lets you define which effects to use in a layer style. Once you save a layer style, it appears in the new styles palette.

Applying layer styles is easy: you create type, shapes, and other artwork elements on a layer, and then click a style in the Styles palette to apply it.

With the new slice tool and slice select tool, you can now slice Web graphics directly in Photoshop. Create user-defined slices by dragging over different image areas with the slice tool. Photoshop defines slices automatically for the areas you don't define, so that an HTML table can be generated during export.[3] You can modify many attributes of Photoshop slices, including size, position, stacking order, and visibility.

PowerPoint

PowerPoint is multimedia display software. It is one component of Office suite software. It provides means for making multimedia display. PowerPoint has very strong functions for making slides. You can input title and text easily, and also add montage pictures, spreadsheets, graphs on the slide, and change the layout of the slide, adjust their sequence, delete or duplicate the slide.

After entering PowerPoint, an "activation dialogue box" first appears. It provides four ways to set up a display file. The display file is a series of slides. Each slide can be seen as an independent page of a book. A slide can be used to display outline, text, numbers, analytic spreadsheets or images, and by "link", it can realize hypertext and hypermedia. Each slide follows a standard format, which is called "template". In display software, various module libraries are available for selection.

Using "view" button, PowerPoint can perform view switching. Regardless of what view is selected, contents of the display file will not change. PowerPoint provided five views.

Common view—It is the most commonly used view. Using it, you can put all the slides in a sequence or organize all slides in the display file into a structure.

Outline view—When switching to outline view, you can edit the display file's outline structure.

Slide view—In this view, you can display each slide and edit its details.

Overlook view—In this view, a diminished view of each slide, a complete file and photos in a display file can be shown. You can reset their sequence, add switching and animated effects and set projection time.[4]

Projection of slides—It performs projection of slides. In slide view, projection begin with the current slide, and in overlook view, projection begins with the selected slide.

Graphs and sheets can help audience to see clearly tendency and proportion. EXCEL electronic spreadsheets and graphs can be introduced into slides to show 2-dimentional or 3-dimentional effect. You can also use rotating graphs and spreadsheets to help visual effect. You can also combine multiple figures into one, or combine figures with correspondent graphs and spreadsheets into one slide.

Self-defined animation effect is used mostly, and is applicable to more objects. First, select "self-define" command from "slide projection" menu to open "self-define" dialogue box. Second, set the projection order of each object (it is possible to project the object soon after the precedent one or after several seconds, or by clicking the mouse), and set animation effect together with sound effect. If the object is photo, animation effect is possible; if the object is text, it can project them one word after another or project them in a group.[5]

It is possible to add hyperlink in display file to transfer to different positions, for example, skip to slide, other display files, Word files, EXCEL spreadsheet or other applied procedures, etc. To do this, you will first select text or objects to be hyperlinked; second, use "hyperlink" command in "insert" tool bar; third, single click the slide or files to be hyperlinked in the "insert hyperlink" dialogue box. In projection, when the mouse arrives at the object (underlined) or hyperlinked object, the mouse arrow will turn into a "hand" as a sign of hyperlink.

Using "action" button in the "slide projection" menu, you can insert various action buttons onto the slide. In so doing, an "action setting" dialogue box will pop up automatically for you to select the skip position in the "hyperlink list".

Key Words

asset	财产
customizable	可定制的
editable	可编辑的
evaluation	评价，评估
inspector	检查员，监察员
intuitive	知觉的，直观的
novice	初学者，新手
ongoing	进一步的，前进的
palette	调色板
panel	面，板
precedent	前例，惯例

projection	投影，放映
retouch	润色，修饰
spreadsheet	电子表格
streamline	流线
template	模板
tendency	倾向，趋势，偏好
twist	旋转，扭
underline	下画线

Notes

[1] To change the view in which you are working, select a view in the Dreamweaver toolbar.

“To change…”是目的状语，本句的主语省略，可以是“you”。

译文：在 Dreamweaver 工具条选择视图，就改变正在工作的视图。

[2] Whether you are a novice or an expert in image editing, the Photoshop program offers you the tools you need to get professional-quality results.

“Whether you are a novice or an expert in image editing”引导的是状语从句，“you need to get professional-quality results”是定语，修饰“tools”。

译文：不论你是一位初学者，还是一位图像编辑方面的专家，Photoshop 程序都为你提供了获得专业水准作品所需的多种工具。

[3] Photoshop defines slices automatically for the areas you don’t define, so that an HTML table can be generated during export.

本句由“so that”引导目的状语从句。

译文：对没有定义的区域，Photoshop 会自动定义切片组，这样在输出时可以生成一个 HTML 表。

[4] You can reset their sequence, add switching and animated effects and set projection time.

本句的主语是“you”，“reset”、“add”和“set”都是谓语。

译文：你可以重新安排它们的顺序，增加切换和动画效果并设定放映时间。

[5] If the object is photo, animation effect is possible; if the object is text, it can project them one word after another or project them in a group.

这是两个并列的句子，讲述两种情况，分别由“if”引导条件状语从句。

译文：如果该对象是照片，动画效果是必要的；如果它是文字，就可以逐字或成组地放映它们。

3.5.2 Exercises

1．Translate the following phrases into English

（1）模型库

（2）对话框

（3）矢量图形

（4）圆角矩形

（5）大纲视图

（6）可视化编辑环境

（7）幻灯片放映

（8）代码视图

2．Translate the following phrases into Chinese

（1）sound effect

（2）overlook view

（3）design view

（4）single click

（5）text document

（6）projection order

（7）multimedia display software

（8）action button

3．Identify the following to be True or False according to the text

（1）After entering Flash, an “activation dialogue box” first appears.

（2）Macromedia Dreamweaver is a professional HTML editor for visually designing and managing web sites and pages.

（3）Photoshop provides integrated tools for creating and outputting crisp, editable vector shapes and text.

（4）Using “style” button, PowerPoint can perform view switching.

（5）Dreamweaver is not fully customizable.

（6）Graphs and sheets can help audience to see clearly tendency and proportion.

（7）Dreamweaver includes many coding tools and features.

（8）In outline view, you can display each slide and edit its details.

4．Reading Comprehension

（1）You can also combine multiple figures into_____, or combine figures with correspondent graphs and spreadsheets into one slide.

a．one

b．two

c．three

d．four

（2）You can modify many attributes of _____slices, including size, position, stacking order, and visibility.

a．Powerpoint

b．Photoshop

c．Excel

d．Access

（3）Dreamweaver’s visual editing features also let you quickly add design and functionality to your pages without writing a line of _____ .

a．text

b．word

c. keyword

d. code

（4）Using “action” button in the “_____” menu, you can insert various action buttons onto the slide.

a. slide projection

b. view

c. outline view

d. slide

3.5.3 Reading Material

Video Compression

Computers can not handle analog information directly—they have to simulate it. Computers start by digitizing the video, or by dividing the analog frame into individual picture elements (pixels). A 640-by-480 frame requires 307,200 pixels, each of which takes one byte to store. Add the 24-bit color depth necessary for high-quality video and you have tripled the storage requirement to 921,600 bytes per frame. At 30 frames per second, you’re up to 9.2 million pixels and over 27MB of data—each second! This not only presents tremendous storage and bandwidth problems, it is more data than even the most powerful desktop computer can handle in real time.

A number of simple scaling techniques are used to reduce the load. The first is to shrink the image size. Quarter-screen video (320-by-240) requires one quarter the bandwidth of full-screen video (640-by-480), which brings you down to 6.912 megabytes per second. The second is to cut the frame rate, which is the number of frames displayed per second. Most video is acquired at 30 frames per second (fps), the same rate as television. Dropping from 30 to 15 fps cuts your data rate in half, to about 3.5MB per second. The third technique is to reduce the color depth. Dropping from 24-bit to 8-bit reduces the data rate by another two thirds, taking you down to just over 1.1MB per second.

Unfortunately, even a data rate of 1.1MB per second is still too high for even quadruple-speed CD-ROM drives and most non-SCSI hard disks. So scaling the image size, frame rate, and color depth still does not get the job done. That’s where video compression comes in.

Video compression is a collection of techniques used to shrink video files. Embodied by products called codecs (compression/decompression), these methods fall into two general categories: interframe and intraframe compression.

Interframe compression uses a system of key and delta frame, while delta, or “difference”, frames record only the interframe changes. During decompression, the CPU builds frames from the key frames and accumulated deltas.

Intraframe compression is performed entirely within individual frames. During intraframe compression, codecs use a variety of techniques to convert pixels to more compact mathematical formulas. The simplest technique is called run length encoding (RLE), in which rows of adjacent identical pixels are grouped together.

Intraframe technologies range from simple RLE to documented standards such as JPEG to

exotic mathematical disciplines such as wavelets and fractal transform. Not all codecs use both interframe and intraframe techniques—some use only intraframe. Those that use both apply intraframe compression on key frames and the information remaining in delta frames after removing interframe redundancies.

A standard video source, such as a camcorder, VCR, or laserdisc player, transmits the analog video signal to the video-capture board, while analog audio is sent to a sound board inside the PC.

The capture board utilizes analog-to-digital converters (ADCs) to transform the analog video signal into binary code. The video footage can be captured as a raw sequence of video frames, which is sent to and held in system RAM where software compression is performed.

Meanwhile, the audio signal undergoes analog-to-digital conversion by the second board's converters. This information is also sent to the PC's main system RAM.

After the video and sound tracks have been captured, the captured signal can be stored directly to the hard disk or software-based compression can be applied. Generally, the digital video and audio signals are stored as a synchronized, or interleaved. AVI file on the hard disk.

Unit 4 Network Knowledge

4.1 Computer Networks

4.1.1 Text

Network establishes communication among computers. This system is especially helpful when people work on different place. It improves the speed and accuracy of communication, prevents messages from being misplaced and automatically ensures total distribution of key information.

A network consists of several computers linked by communication lines. The machines can perform the functions independently, but their activities can also be coordinated. Originally the aim was the exchange of information (program, data files) between the users of different mainframes. When smaller computers became available and spread in large numbers within a single organization, connections between these small computers became attractive for the shared use of resources (printer, disk, processing time) as well. The resulting systems,in which computers of possibly different type and size are connected but fully retain their autonomy, are called computer networks.

Local Area Networks (LANs) and Wide Area Networks (WANs)

A local area networks, or LAN, is a communication network that is privately owned and that covers a limited geographic area such as an office, a building, or a group of building. The LAN consists of a communication channel that connects either a series of computer terminals together with a minicomputer or, more commonly, a group of personal computers to one another. Very sophisticated LANs can connect a variety of office devices such as word processing equipment, computer terminals, video equipment and personal computers. Two common applications of local area networks are hardware resource sharing and information resource sharing. Hardware resource sharing allows each personal computer in the network to access and use devices that would be too expensive to provide for each user. Information resource sharing allows anyone using a personal computer on the local area network to access data stored on any other computer in the network.[1] In actual practice, hardware resource sharing and information resource sharing are often combined.

A wide area network, or WAN, is geographic in scope (as opposed to local) and uses telephone lines, microwaves, satellites, or a combination of communication channels. Public wide area network companies include so-called common carriers such as the telephone companies. Telephone company deregulation has encouraged a number of computers of companies to build their own wide area networks.

Network Configuration

The configuration, or physical layout, of the equipment in a communication network is called

topology. Communication networks are usually configured in one or a combination of three patterns. These configurations are star, bus, and ring networks. Although these configurations can be used with wide area networks, we illustrate them with local area networks. Devices connected to a network, such as terminal, printers, or other computers, are referred to as nodes.

- Star Network

A star network contains a central computer and one or more terminals or personal computers connected to it, forming a star.[2] A pure star network consists of only point-to-point lines between the terminals and the computer, but most star networks include both point-to-point lines and multi-drop lines. A star network configuration is often used when the central computer contains all the data required to process the input from the terminals, Such as an airline reservation system. For example, if inquiries were being processed in the star network, all the data to answer the inquiry would be contained in the database stored on the central computer.

A star network can be relatively efficient, and close control can be kept over the data processed on the network. Its major disadvantage is that the entire network is dependent on the central computer and the associated hardware and software. If any of these elements fail, the entire network is disabled. Therefore, in most large star networks, backup computer systems are available in case the primary system fails.

- Bus Network

When a bus network is used, all the devices in the network are connected to a single cable. Information is transmitted in either direction from any one personal computer to another. Any message can be directed to specific device. An advantage of the bus network is that devices can be attached or detached from the network at any point without disturbing the rest of the network. In addition, if one computer on the network fails, this does not affect the other users of the network.

- Ring Network

A ring network does not use a centralized host computer. Rather, a circle of computers communicate with one another. A ring network can be useful when the processing is not done at a central site, but at local sites. For example, computers could be located in three departments: accounting, personnel, and shipping and receiving. The computers in each of these departments could perform the processing required for each of the departments. On occasion, however, the computer in the shipping and receiving department could communicate with the computer in the accounting department to update certain data stored on the accounting department computer. Data travels around a ring network in one direction only and passes through each node. Thus, one disadvantage of a ring network is that if one node fails, the entire network fails because the data does not get past the failed node.[3] An advantage of a ring network is that less cable is usually needed and therefore network cabling costs are lower.

Network devices

A bridge is used to join two physically separate networks. Bridges link together systems at the OSI Reference Model’s, the data link. To the user, a resource connected to the local system by a bridge works the same as a local resource. Newer intelligent bridges can filter or segregate network

traffic so that local packets don’t get needleddly transferred to the remote system.

Bridges are protocol—independent. Once the physical link is made, the bridge can transmit any higher—level network protocol.[4] The easiest way to put performance back into an over—burdened Ethernet is to subdivide the network with a bridge. A bridge connects two networks, keeping local data traffic local and sending on only those packets intended for stations not in the local subset.

Routers are more complicated to set up than bridges. They link LAN’s at OSI’s Level 3, the network layer. Unlike bridges, which simple pass high-level network protocols between two physically separate or different topologies, routers examine the destination of network packets and can redirect network traffic if necessary. A router can connect more than two systems and will direct network traffic to the appropriate system.

Gateway combines hardware and software to connect dissimilar LANs running different protocols.[5] They translate all protocols above the OSI network layer (layer 3) and, since they often connect completely different systems, also perform protocol conversion and network address translation. Gateways are more complex to engineer than bridges or routers. There is subtle difference: a gateway connects dissimilar networks, and a bridge connects similar networks.

Key Words

attractive	有吸引力的
autonomy	自治，自治权
backup	备份
channel	通道，频道
coordinate	同等的，并列的
deregulation	撤销，解除控制
detach	使分离，分遣
disable	使无能
disadvantage	缺点
dissimilar	不同的，相异的
Ethernet	以太网
filter	过滤，渗透
gateway	网关
geographic	地理的
independently	独立地，自立地
inquiry	质询，探索
misplace	放错地方
node	网络节点，连接到网络上的设备
router	路由器
satellite	卫星
scope	范围，广度
segregate	分离，隔离
subdivide	再分

topology 拓扑学，地学志

Notes

[1] Information resource sharing allows anyone using a personal computer on the local area network to access data stored on any other computer in the network.

本句中的“anyone”作宾语，“using a personal computer on the local area network”作“anyone”的定语，“to access data”作宾语补足语。

译文：信息资源共享允许局域网上每一个计算机用户访问存储于网上其他计算机中的数据。

[2] A star network contains a central computer and one or more terminals or personal computers connected to it, forming a star.

本句中的“a central computer and one or more terminals or personal computers”作宾语。

译文：星形网络由一台中央计算机和一台或多台连接到该中央计算机上并形成星形结构的终端或计算机组成。

[3] Thus, one disadvantage of a ring network is that if one node fails, the entire network fails because the data does not get past the failed node.

本句中的“that”引导表语从句，“if one node fails”作条件状语，而“because the data does not get past the failed node”作原因状语。

译文：因此，环形网络的缺点是如果一个节点出现故障，就会产生由于数据不能通过而出现故障的节点，使整个网络无法工作。

[4] Once the physical link is made, the bridge can transmit any higher—level network protocol.

本句中的“Once the physical link is made”是时间状语从句。

译文：一旦建立起物理连接，网桥就能传送任何更高层的网络协议。

[5] Gateway combines hardware and software to connect dissimilar LANs running different protocols.

这里的“to connect dissimilar LANs running different protocols”作宾语补足语。

译文：网关把硬件和软件结合起来，连接运行不同协议的局域网。

4.1.2 Exercises

1．Translate the following phrases into English

（1）硬件资源共享

（2）局域网

（3）广域网

（4）物理布局

（5）微波

（6）环网

（7）点对点

（8）网络配置

2．Translate the following phrases into Chinese

（1）star network

（2）video equipment

（3）telephone line

（4）high-level network protocol

（5）multi-drop

（6）common carriers

（7）common carriers

（8）bus network

3．Identify the following to be True or False according to the text

（1）A ring network can transmit information from any one personal computer to another.

（2）The network cabling costs of the ring networks are very lower.

（3）A gateway could be used to connect the different networks.

（4）A bridge is a combination of hardware and software that is used to connect different networks.

（5）A star network does not use a centralized host computer.

（6）In most large star networks, backup computer systems are available.

（7）WAN uses telephone lines, microwaves, satellites, or a combination of communication channels.

（8）Gateways are more complex to engineer than bridges or routers.

4．Reading Comprehension

（1）When a _____is used, all the devices in the network are connected to a single cable.

a．bus network

b．ring network

c．star network

d．network

（2）A _____contains a central computer named host computer.

a．WAN

b．star network

c．ring network

d．network

（3）An advantage of a ring network is that it needs less _____.

a．computer

b．network

c．cable

d．information

（4）Two common applications of LANs are_____resource sharing and information resource sharing.

a．software

b．computer

c．network

d．hardware

4.1.3 Reading material

Internet

Every computer on the Internet is part of a unique address called a “dotted quad” IP address. For example, computers on a given campus or in any business company have a subnet number to the IP address.

The Internet is an international web of interconnected government, education, and business computer networks—in essence, a network of networks. A person at a computer terminal or personal computer with the proper software communicates across the Internet by placing data in an Internet Protocol (IP) packet—an electronic envelope—and “addressing” the packet to a particular destination on the Internet. Communications software on the intervening networks between the source and destination networks “read” the addresses on packets moving through the Internet and forward the packets toward their destinations.

How To Use Internet

Windows provides you with quick and easy access to the Internet, no matter what programs you are running or tasks you are performing. The Active Desktop allows you to customize your workspace and the Address bar helps you to connect to the Internet from any window. You can also find a variety of tools that help you to communicate with people and other computers.

Most people connect to the Internet by using network connection or Internet service provider (ISP). An ISP supplies a service number that you can dial from your computer to log on the Internet server. Once you connect to the system, you have access to the Internet, E-mail, and any other services supplied by your ISP. Your ISP also furnishes you with the details you need to configure an Internet connection on your computer. If you use a network connection, your system administrator provides this information for you.

With the communication tools included in Windows, you can use your computer to send E-mail, handle phone calls, send a fax, or conduct a meeting with a video conference. For example, you can use Phone Dialer to answer phone calls or join a video conference in your company. With Internet Explorer and an Internet connection, you can search for and view information on the World Wide Web. You can type the address of the Web page that you want to visit into the address bar, or click an address from your list of favorites. Internet Explorer also lets you search the Internet for people, business, and information about subjects that interests you.

Internet Services

The most popular and widespread Internet application services include:

（1）World Wide Web (WWW)

WWW is a large network of Internet servers providing hypertext and other services to terminals running client applications such as a browser. WWW enables users to search, access, and download information from a worldwide series of networked servers where information is dynamically interlinked. A Web client passes a user’s request for information to a server, usually by way of a Web

browser. The server and client communicate through a transfer protocol, usually the HyperText Transfer Protocol (HTTP). The server then accesses a Web page using a Uniform Resource Locator (URL). Search engines are available to simplify access by enabling users to enter search criteria on a topic and have several URLs returned for Web pages that pertain to the desired information.

（2）Electronic mail (E-mail)

Electronic mail allows a user to compose memos and send them to individuals or groups. Another part of the mail application allows users to read memos that they are received. There are two kinds of E-mail protocol used in the Internet. One is Simple Mail Transfer Protocol (SMTP) which accepts incoming connections and copies messages from them into the appropriate mailboxes. Another is Post Office Protocol-3 (POP3) which fetches E-mail from the remote mailbox and stores it on the user's local machine to be read later.

（3）File Transfer Protocol (FTP)

FTP is an application protocol, part of the TCP/IP protocol stack, used for transferring files between network nodes. The TCP/IP protocols include a file transfer application program that allows users to send or receive arbitrarily large files of programs or data. For example, using the file transfer program, one can copy from one machine to another a large database containing satellite images, a program written in Pascal or C++, or even an English dictionary. The system provides a way to check for authorized users, or even to prevent all access.

（4）Telecommunication network (Telnet)

Telnet is a standard terminal emulation protocol in the TCP/IP protocol stack. Telnet is used for remote terminal connection, enabling users to log into remote systems and use resources as is they were connected to a local system. The remote login makes it appear that a window on the user's screen connects directly to the remote machine by sending each keystroke from the user's keyboard to the remote machine and displaying each character the remote computer prints in the user's window. When the remote login session terminates, the application returns the user to the local system.

4.2 How Internet Search Engines Work

4.2.1 Text

The good news about the Internet and its most visible component, the World Wide Web, is that there are hundreds of millions of pages available, waiting to present information on an amazing variety of topics.[1] The bad news about the Internet is that there are hundreds of millions of pages available, most of them titled according to the whim of there author, almost all of them sitting on servers with cryptic names. When you need to know about a particular subject, how do you know which pages to read? If you like most people, you should visit an Internet search engine.

Internet search engines are special sites on the Web that are designed to help people find information stored on other sites. There are differences in the ways various search engines work, but they all perform three basic tasks:

- They search the Internet—or select pieces of the Internet—based on key words.

- They keep an index of the words they find, and where they find them.
- They allow users to look for words or combinations of words found in that index.

Early search engines held an index of a few hundred thousand pages and documents, and received maybe one or two thousand inquiries each day. Today, a top search will index hundreds of millions of pages, and respond to tens of millions of queries per day.

When most people talk about Internet search engines, they really mean World Wide Web search engines. Before the Web became the most visible part of the Internet, there were already search engines in place to help people find information on the Net. Programs with names like “Gopher” and “Archie” kept indexes of files stored on servers connected to the Internet, and dramatically reduced the amount of time required to find programs and documents. In the late 1980s, getting serious value from the Internet meant knowing how to use Gopher, Archie, Veronica and the rest.

To find information on the hundreds of millions of Web pages that exist, a search engine employs special software robots, called spiders, to build lists of the words found on Web sites. When a spider is building its lists, the process is called Web crawling.[2] In order to build and maintain a useful list of words, a search engine’s spiders have to look at a lot of pages.

How does any spider start its travels over the Web? The usual starting points are lists of heavily used servers and very popular pages. The spider will begin with a popular site, indexing the words on its pages and following every link found within the site. In this way, the spider system quickly begins to travel, spreading out across the most widely used portions of the Web.

Google.com begins as an academic search engine. In the paper that describes how the system was built, Sergey Brin and Lawrence Page give an example of how quickly their spiders can work. They built their initial system to use multiple spiders, usually three at one time. Each spider could keep about 300 connections to Web pages open at a time. At its peak performance, using four spiders, their system could crawl over 100 pages per second, generating around 600 kilobytes of data each second.

Keeping everything running quickly meant building a system to feed necessary information to the spiders.[3] The early Google system had a server dedicated to providing URLs to the spiders. Rather than depending on an Internet service for the Domain Name Server (DNS) that translates a server’s name into an address, Google had its own DNS, in order to keep delays to a minimum.

When a Google spider looked at an HTML page, it took note of two things:

- The words within the page.
- Where the words were found.

Words occurring in the title, subtitles, meta tags and other positions of relative importance were noted for special consideration during a subsequent user search. The Google spider was built to index every significant word on a page, leaving out the articles “a”, “an” and “the”. Other spiders take different approaches.

These different approaches usually attempt to make the spider operate faster, allow users to search more efficiently, or both. For example, some spiders will keep track of the words in the title, sub-headings and links, along with the 100 most frequently used words on the page and each word in the first 20 lines of text.

Once the spiders have completed the task of finding information on Web pages (and we should note that this is a task that is never actually completed—the constantly changing nature of the Web means that the spiders are always crawling), the search engine must store the information in a way that makes it useful. There are two key components involved in making the gathered data accessible to users:

- The information stored with the data.
- The method by which the information is indexed.

In the simplest case, a search engine could just store the word and the URL where it was found.[4] In reality, this would make for an engine of limited use, since there would be no way of telling whether the word was used in an important or a trivial way on the page, whether the word was used once or many times or whether the page contained links to other pages containing the word. In other words, there would be no way of building the ranking list that tries to present the most useful pages at the top of the list of search results.

To make for more useful results, most search engines store more than just the word and URL. An engine might store the number of times that the word appears on a page. The engine might assign a weight to each entry, with increasing values assigned to words as they appear near the top of the document, in sub-headings, in links, in the meta tags or in the title of the page. Each commercial search engine has a different formula for assigning weight to the words in its index. This is one of the reasons that a search for the same word on different search engines will produce different lists, with the pages presented in different orders.[5]

Regardless of the precise combination of additional pieces of information stored by a search engine, the data will be encoded to save storage space. For example, the original Google paper describes using 2 bytes to store information on weighting—whether the word was capitalized, its font size, position, and other information to help in ranking the hit. Each factor might take up 2 or 3 bits within the 2-byte groups. As a result, a great deal of information can be stored in a very compact form. After the information is compacted, it's ready for indexing. An index has a single purpose: it allows information to be found as quickly as possible.

One of the areas of search engine research is concept-based searching. Some of this research involves using statistical analysis on pages containing the words or phrases you search for, in order to find other pages you might be interested in. obviously, the information stored about each page is greater for a concept-based search engine, and far more processing is required for each search. Still, many groups are working to improve both results and performance of this type of search engine. Others have moved on to another area of research, called natural-language queries. The most popular natural language query site today is AskJeeves.com, which papers the query for keywords that it then applies to the index of sites it has built. It only works with simple queries; but competition is heavy to develop a natural-language query engine that can accept a query of great complexity.

Key Words

accessible	容易理解的
amazing	令人惊异的

capitalize	用大写字母写
compact	压缩，简洁，简化
crawl	爬行
cryptic	神秘的，难解的，隐藏的
dedicate	专门用于某事，奉献
dramatically	戏剧性的，激动人心的
peak	减少，缩小
popular	通俗的，普通的，流行的
ranking	顺序
spider	蜘蛛
subsequent	其后的，其次的，附随的
subtitle	副题，小标题
topic	论题，标题，题目
track	轨迹，跟踪，导向
visible	可见的，显著的
whim	奇想，怪想

Notes

[1] The good news about the Internet and its most visible component, the World Wide Web, is that there are hundreds of millions of pages available, waiting to present information on an amazing variety of topics.

“the World Wide Web”作“component”的同位语，“that”引导的是表语从句。

译文：对于互联网和它的重要组成——万维网来说，好的一点是那里有数以百万计的网页，包括各种各样的信息供人查阅。

[2] When a spider is building its lists, the process is called Web crawling.

本句由“When”引导时间状语从句。

译文：蜘蛛建立列表时，其过程称为网络爬行。

[3] Keeping everything running quickly meant building a system to feed necessary information to the spiders.

本句的主语是现在分词短语“Keeping everything running quickly”，宾语也为分词短语“building a system”，“to …”作宾语补足语。

译文：保证其快速运行，则意味着需要建立一个为蜘蛛提供必要信息的系统。

[4] In the simplest case, a search engine could just store the word and the URL where it was found.

“In the simplest case”是条件状语，“where it was found”作定语，修饰“URL”。

译文：最简单的情况下，搜索引擎只需将所搜寻到的关键字以及它所在的地址保存下来。实际上，这样的搜索引擎是用处不大的。

[5] This is one of the reasons that a search for the same words on different search engines will produce different lists, with the pages presented in different orders.

本句的“that …”是定语从句，“with …”作补足语。

译文：这也是在不同的搜索引擎上搜索同一个关键字，得到的列表网页的排列顺序不同的原因之一。

4.2.2 Exercises

1．Translate the following phrases into English

（1）万维网

（2）集成数据

（3）学术搜索引擎

（4）压缩形式

（5）网页

（6）自然语言查询

（7）网站

（8）统计分析

2．Translate the following phrases into Chinese

（1）Internet search engine

（2）serious value

（3）Domain Name Server

（4）software robot

（5）font size

（6）concept-based searching

（7）Web crawling

（8）key component

3．Identify the following to be True or False according to the text

（1）The Google spider was built to index every significant word on a page.

（2）An index has a single purpose: it allows information to be found as quickly as possible.

（3）Web sites keep an index of the words they find, and where they find them.

（4）An engine might store the number of times that the word appears on a page.

（5）Internet search engines are special sites on the Web that are designed to help people find information stored on their machine.

（6）The most popular natural language query site today is AskJeeves.com.

（7）These different approaches usually attempt to make the spider operate faster, allow users to search more efficiently, or both.

（8）Regardless of the precise combination of additional pieces of information stored by a search engine, the data will be encoded to save time.

4．Reading Comprehension

（1）To make for more useful results, most search engines store more than just_____ .

a．the URL

b．the word

c．the word and URL

d．the key word

（2）To find information on the hundreds of millions of _____that exist, a search engine employs special software robots, called spiders, to build lists of the words found on Web sites.

a. Internet pages
b. URL
c. spiders
d. Web pages

（3）Once the _____have completed the task of finding information on Web pages, the search engine must store the information in a way that makes it useful.

a. spiders
b. tools
c. search engines
d. robots

（4）In order to build and maintain a useful list of_____, a search engine's spiders have to look at a lot of pages.

a. words
b. pages
c. URL
d. information

4.2.3 Reading Material

Network Management

Managing complex networks is a challenge most organizations face. Good management delivers high service quality, high availability, and controls the costs of ownership (staffing, facilities, and upgrades).

Management tasks can be grouped into tactical and strategic categories. Tactical tasks are related to responding to current situations such as failures, congestion, and unacceptable service quality. These tasks include troubleshooting, configuration, and adjusting traffic flows. Strategic tasks take a longer-term perspective. They are oriented toward adequate planning to avoid shortages as the network grows. In addition, strategic tasks use information to adjust operations, optimize quality, and manage facilities to reduce overall operational costs.

The most common framework depicted in Network management designs is centered on the Open Systems Interconnect (OSI). Management Functional Areas include user Management, Resource Management, Configuration Management, Performance Management, and Fault Management & Security.

User Management—Accounting & Cost Management

Accounting management function is to register user's information—user name, user domains, userjurisdiction, password, and confirm password. Other rationalize the accounting is a server specific function and should be managed by the system administration. Cost management is an

avenue in which the reliability, operability and maintainability of managed objects are addressed. This function is an enabler to upgrade equipment, delete unused services and tune the functionality of the servers to the services provided. By continuously addressing the cost of maintenance, costs associated with maintaining the network as a system can be tuned.

Resource Management— (System Management & Management Functional Domains (MFDs))

System Management is the management and administration of services provided on the network. Resource Management is implement and support source of network. Good system management will be significant capabilities streamline business processes, and save the customers' money with just a little work. These products can be easily integrated into the overall Network Management System. Management Functional Domains (MFDs) are the segmentation of the Enterprise Network Management System in localized functional domains.

Configuration Management

Configuration management is probably, the most important part of network management in that you cannot accurately manage a network unless you can manage the configuration of the network. Changes, additions and deletions from the network need to be coordinated with the network management systems personnel. Dynamic updating of the configuration needs to be accomplished periodically to ensure the configuration is known.

Performance Management

Performance is a key concern to most MIS. Performance management is to monitor and track network activity, and to ensure performance of system. Performance of Wide Area Network (WAN) links, telephone trunk utilization, etc., are areas that must be revisited.

Maintenance—Security & Fault Management

Most network management applications only address security applicable to network hardware such as someone logging into a router or bridge. Some network management systems have alarm detection and reporting capabilities as part of physical security (contact closure, fire alarm, interface, etc.).

Fault Management is the detection of a problem, fault isolation and correction to normal operation. Most systems poll the managed object search for error conditions and illustrate the problem in either a graphic format or a textual message. Most of these types of messages are set up by the person configuring the polling on the Element Management System. Some Element Management Systems collect data directly from a log receiving the alarm as it occurs. Fault management deals most commonly with events and traps as they occur on the network.

4.3 Wireless Network

4.3.1 Text

In the time span of just a few years, wireless local area networking went from being a novelty to revolutionizing the way many organizations connect their computers. Visit any major department store, hospital, or office building, and you will encounter 802.11 cards in all of the PCs and access points hanging from ceiling. The speed with which wireless networking has caught on is not surprising, as 802.11b offers up to 11 Mbps of bandwidth, and a range of several hundred feet. Newer standards, such as 802.11g, promise five times the speed (54 Mbps). Multiple wireless access points can be easily installed on the same network to increase the coverage area, so that an entire building can be easily connected. Conversely, working buildings with Ethernet is expensive and limits the locations from which networked computers can be used.

Wireless vendors face the challenge of supporting increasingly bandwidth hungry applications, such as voice over IP, streaming video and videoconferencing. To dramatically increase throughput, 802.11a proponents had to solve a major challenge of indoor radio frequency. They had to develop a way to resolve the problem of delay spread in the current 2.4GHz, single-carrier and delay-spread system.

Delay spread is caused by the echoing of transmitted radio frequency. As these signals proceed to a certain point, such as a wireless antenna, they often bounce and echo off objects, walls, furniture and floors, and arrive at the antenna at different times due to the different path lengths.[1] A baseband processor, or equalizer, is required to “unravel” the divergent radio frequency signals. The delay spread must be less than the symbol rate, or the rate at which data is encoded for transmission. If not, some of the delayed signal spreads into the next symbol transmission. This can put a ceiling on the maximum bit rate that can be sustained.

With current bit-rate technology, this ceiling tends to be around 10M to 20M bit/sec. The 802.11a standard cleverly solves this challenge through an innovative modulation technique called Coded Orthogonal Frequency Division Multiplexing (COFDM), which has found earlier application in European digital TV and audio transmission.[2]

COFDM breaks the ceiling of the data bit rate by (1) sending data in a massively parallel fashion；(2) slowing the symbol rate down so each symbol transmission is much longer than the typical delay spread. A guard interval (sometimes called a cyclic prefix) is inserted at the beginning of the symbol transmission to let all delayed signals “settle” before the baseband processor demodulates the data.

Wireless vendors now have a goal to boost wireless throughput beyond 100M bit/sec. While the 802.11a standard currently tops out at 54M bit/sec in 20MHz channels, several firms are developing and proposing high-rate extensions to the 802.11a standard. These proposals generally envision at least doubling throughput to anywhere from 108M to 155M bit/sec.

Most new laptops purchased today are outfitted with built-in 802.11 networking capabilities, and configuring a home or office wireless network out of the box can take less than 10 minutes. Furthermore, PC card are rapidly coming down in price and increasing in power. The economic

forces influencing wireless networking are matched only by the convenience to users.

Wide-scale adoption of 802.11 was inevitable, and the general expectation is that it will only increase. Eventually, it is likely that most public areas will offer some sort of wireless connectively; there are initiatives to extend coverage to airplanes and trains, as well as shopping malls and airports.

An IEEE 802.11 WLAN is a group of stations (wireless network nodes) located within a limited physical area, where each station is capable of radio communication with a base station. There are two WLAN design structures: ad hoc and infrastructure networks. The vast majority of installations use infrastructure-based WLANs.

An ad hoc WLAN has no ability to communicate with external networks without using additional outing protocols. An ad hoc WLAN is normally created to permit multiple wireless stations to communicate directly with each other, requiring minimal hardware and management.[3]

An infrastructure-based WLAN is composed of one or more Basic Services Set (BSS). Each station has exactly one BSS connecting it to the infrastructure, the Distribution System (DS), which allows access to external networks. The station's attachment point to the DS, called the Access Point (AP), relays packets from the station within the BSS to the DS.

Infrared Technology

Infrared (IR) technology has gained popularity in recent years as a way to set up wireless links between office PCs and a handheld device or printer. Infrared technology sends data as infrared light rays. Like your infrared television remote control, infrared technology requires line-of-sight transmission.[4] Because of this limitation, many formerly infrared devices (such as wireless mice and keyboards) now use radio technology instead.

Some applications still using infrared technology include beaming data from a handheld PC, notebook, digital camera, or other device to desktop computer, sending documents from a portable PC to a printer, and connecting a portable PC to a company network.

Bluetooth

The Bluetooth standard is a low-cost, short-range, wireless radio solution for communications between handheld PCs, mobile phones, and other portable devices, as well as for connecting those devices to home and business equipment, such as PCs, telephones, printers, and soon[5] Bluetooth wireless technology facilitates real-time voice and data transmissions between Bluetooth-enabled devices (devices containing a special Bluetooth transceiver chip). For example, a Bluetooth earpiece or headset can be used in conjunction with a cell phone left in a pocket or bag, or a PDA device can be instantly synchronized with a desktop PC on entering the office. Since Bluetooth devices automatically recognize each other when they get within transmission range—about 10 meters without an amplifier—handheld PCs, cell phones, and other portable devices can always be networked wirelessly when they are within range. Some industry experts predict that all household appliances will be Bluetooth-enabled in the future, resulting in an automatic, always connected smart home.

Wireless Ethernet

Wireless Ethernet allows the Ethernet standard to be used with wireless network connections. It is also known as Wi-Fi, though technically the Wi-Fi label can only be used with wireless Ethernet products that are certified by the wireless Ethernet compatibility Alliance. Users of Wi-Fi certified products are assured that their hardware will be compatible with all other Wi-Fi certified hardware.

The IEEE 802.11 standard extends the carrier-sensing multiple access principle employed by Ethernet technology to suit the characteristic of wireless communication. The 802.11 standard is intended to support communication between computers located within about 150 meters of each other at speed up to 54 Mbps. Wireless Ethernet is a growing choice for organizations wishing to extend their wired Ethernet network.

Key Words

amplifier	放大器，扩大器
antenna	天线，触角
Bluetooth	蓝牙
certify	证明
compatible	兼容的，协调的，相容的
conversely	逆转地，相反地
coverage	范围，规模
demodulate	解调，检波
divergent	分歧的，发散的
equalizer	均衡器，补偿器，平衡装置
inevitable	不可避免的，必然的
infrared	红外线的
infrastructure	基础设施，架构，基地
initiative	起始的，创始的
innovative	革新的，创新的
laptop	微型便携式的（电脑）
modulation	调制，调整
multiplexing	复合的，多路复用的，多路传输的
novelty	新奇，奇异，珍奇
orthogonal	正交的，互相垂直的
outfit	装置，装备
prefix	前缀，词首
proponent	提议者，支持者
revolutionize	使革命化，引起革命，彻底改革
settle	安排，处理好
sustain	支撑，维持

Notes

[1] As these signals proceed to a certain point, such as a wireless antenna, they often bounce and echo off objects, walls, furniture and floors, and arrive at the antenna at different times due to the different path lengths.

本句比较长，“as”引导的是时间状语，“such as a wireless antenna”是“a certain point”的同位语，“they often bounce …”与“and arrive at the antenna …”是并列句，后句的主语也是“they”。

译文：在这些信号到达某一点（如无线天线）的过程中，它们常常因物体、墙壁、家具和地板等而产生反射，由于路径长度不同，信号到达天线的时间也不同。

[2] The 802.11a standard cleverly solves this challenge through an innovative modulation technique called Coded Orthogonal Frequency Division Multiplexing (COFDM), which has found earlier application in European digital TV and audio transmission.

本句的“which …”引导非限定性定语从句。

译文：802.11a 标准通过一种称为正交频分多址（COFDM）的创新的调制技术，巧妙地解决了这个挑战，COFDM 早已用于欧洲的数字电视和音频的传输。

[3] An ad hoc WLAN is normally created to permit multiple wireless stations to communicate directly with each other, requiring minimal hardware and management.

本句的“requiring minimal …”作宾语补足语。

译文：建立一个专用 WLAN 通常允许多个无线工作站彼此能直接通信，而需要最小的硬件和管理。

[4] Like your infrared television remote control, infrared technology requires line-of-sight transmission.

“Like your infrared television …”作状语。

译文：如同你的红外电视遥控那样，红外技术需要瞄准传输。

[5] The Bluetooth standard is a low-cost, short-range, wireless radio solution for communications between handheld PCs, mobile phones, and other portable devices, as well as for connecting those devices to home and business equipment, such as PCs, telephones, printers, and more.

本句的“a low-cost, short-range, wireless”作定语，修饰“radio solution”，“for communications between …”和“as well as …”也是定语，“such as PCs, telephones, printers, and more”是“equipment”的同位语。

译文：蓝牙标准是手持 PC、移动电话和其他便携式设备之间低成本、短距离的无线电通信的解决方案，也是这些设备连接到家庭和企业 PC、电话、打印机等设备的无线电通信的解决方案。

4.3.2 Exercises

1．Translate the following phrases into English

（1）周期前缀

（2）分布式系统

（3）无线天线
（4）无线局域网
（5）移动电话
（6）延迟扩展系统
（7）手持设备
（8）基站

2．Translate the following phrases into Chinese

（1）Infrared technology
（2）radio communication
（3）streaming video
（4）symbol transmission
（5）Access Point
（6）Coded Orthogonal Frequency Division Multiplexing
（7）line-of-sight transmission
（8）portable device

3．Identify the following to be True or False according to the text

（1）Wireless Ethernet does not allow the Ethernet standard to be used with wireless network connections.

（2）Wireless vendors face the challenge of supporting increasingly bandwidth hungry applications.

（3）Some experts predict that all household appliances will be Infrared in the future.

（4）Wireless vendors now have a goal to boost wireless throughput beyond 64M bit/sec.

（5）Multiple wireless access points can be easily installed on different network to increase the coverage area.

（6）Many formerly infrared devices, such as wireless mice and keyboards, now use radio technology instead.

（7）Wireless Ethernet is a growing choice for organizations wishing to extend their wired Ethernet network.

（8）It is likely that most public areas will offer some sort of wireless connectively.

4．Reading Comprehension

（1）An ad hoc WLAN has no ability to communicate with _____without using additional outing protocols.

a．networks
b．internal networks
c．Internet
d．external networks

（2）The IEEE 802.11 standard extends the carrier-sensing multiple access principle employed by Ethernet technology to suit the characteristic of_____ .

a．communication
b．wireless communication

c. Buletooth

d. mobile phone

（3）Visit any major department store or office building, you will encounter _____in all of the PCs and access points hanging from ceiling.

a. 802 cards

b. 802.11g cards

c. 802.11a cards

d. 802.11 cards

（4）While the 802.11a standard currently tops out at_____ in 20MHz channels, several firms are developing and proposing high-rate extensions to the 802.11a standard.

a. 54M bit/sec

b. 100M bit/sec

c. 64M bit/sec

d. 36M bit/sec

4.3.3 Reading Material

Ultrawideband

There is certainly no lack of choices when it comes to wireless communications and networking technologies. With all the currently available forms of wireless access—cell phones, 3G, Wi-Fi, WiMax, Bluetooth, power lines, and 802.11a, b, g and n—you wouldn't think there is room for anything more. But technology marches forward, and in the next couple of years, we are going to see a new and different wireless technology.

The new kid on the radio block is ultrawideband, also known as UWB or digital pulse wireless. It will help delivering television programs, movies, games and multimegabyte data files throughout our wireless homes and offices. UWB is faster than current wireless LAN technologies and provides a short-range, high-bandwidth pipe that eliminates interference.

UWB is also a successor to spread-spectrum radio (also called frequency-hopping), a World War II technology that splits a broadcast across many different radio frequencies, using one at a time to avoid jamming. In contrast, UWB uses every frequency available to it, all at the time.

UWB is not a direct substitute for any other form of wireless communications, but it does some things that no other technology can match. A UWB transmitter sends billions of short-duration pulses across a wide spectrum of radio frequencies. These RF bursts come so fast—lasting only from a few trillionths of a few nanoseconds—that each actually uses only a few cycles of an RF carrier wave.

This short duration gives UWB waveforms some unique properties. They are relatively immune to multipath cancellation effects, such as when a strong reflected wave arrives out of phase with the direct path signal, reducing the signal strength in the receiver. UWB pulses are so short that the direct signal has come and gone before the reflected path arrives, so no cancellation takes place. Because UWB pulses are so short, they can use very frequency spectra; this allows signals to use

very low power, which minimizes interference with other radio frequencies, reduces health hazards and often falls below the normal noise floor, thus making it harder to detect.

Technically, UWB is defined as any radio technology whose spectrum occupies more than 20% of the central frequency, or a bandwidth of at least 500 MHz. modern UWB systems use various modulation techniques, including Orthogonal Frequency Division Multiplexing, to occupy these extremely wide bandwidths.

In the current state of development, UWB is aimed at high data rates for personal-area networks, which have an effective operating radius of approximately 10 meters or less. Though similar to the current capabilities of Bluetooth, it uses a very different technology. UWB transmissions trade distance for bandwidth, so the greater the range, the lower the final data rate. Range can be extended up to perhaps a kilometer by using high-gain antennas and reducing performance.

One of UWB's defining characteristics is that it requires very little electrical power—one source says it uses 0.001% as much power as a cell phone—and thus is virtually undetectable by conventional radios, which see the UWB signal as just very quiet background noise. Thus, a UWB telephone would use so little power that it could remain on for weeks without needing to be recharged. And because it uses all available spectra, UWB may well be cheaper to design and manufacture than conventional radios that require careful tuning to a specific frequency.

A UWB transmitter and receiver must be closely coordinated and synchronized to send and receive pulses with an accuracy of trillionths of a second. The receiver responds only to a familiar pulse sequence. UWB products will include radar and electronic location and positioning devices in addition to radios. UWB radar can see right through walls, ceilings and floors that would block or reflect other types of radio signals. As an electronic measuring technology, UWB is more accurate than Global Positioning System satellites, and it can be used indoors. Eventually, UWB networks are expected to run at speeds up to a gigabit per second and therefore should be able to handle all of the phone, television, and Internet traffic for a home or small business.

4.4 Internet Security

4.4.1 Text

Any one responsible for the security of a trusted network will be concerned when connecting it to a distrusted network. In the case of connections to the Internet this concern may be based largely on anecdotal evidence gleaned from widespread media coverage of security breaches. A closer inspection of the facts and statistics behind some of the media coverage will, however, only serve to deepen that concern. For example, the US National Computer Security Agency (NCSA) asserts that most attacks to computer systems go undetected and unreported, citing attacks made against 9000 Department of Defence computers by the US Defence Information Systems Agency (DISA). These attacks had an 88 percent success rate and went undetected by more than 95 percent of the target organizations. Only 5 percent of the 5 percent that detected an attack, a mere 22 sites, reacted to it.

Despite fears about security, organizations are increasingly coming to regard a presence on the Internet as an important part of their strategic planning. Security concerns will not be allowed to

prevent organizations from exploiting the commercial opportunities the Internet is perceived to offer. As a result organizations have to find ways to manage the security issue. This ties growth in the Internet security market directly to growth in the Internet. The compound annual growth rate (CAGR) of the Internet firewall market between 1995 and 2000 is projected to be 174% driven by rapid growth of both the Internet, and Intranets. The most significant trend driving this growth is the rapid and aggressive deployment of World Wide Web servers for both Internet and Intranet use. Unit shipments of web server software are expected to grow from 127,000 units in 1995 to just more than 5 million units in 2000. Although the IT industry has traditionally enjoyed rapid development this level of growth is unprecedented.

Encryption techniques

Encryption is the way to solve the data security problem. There are two kinds of encryption techniques-symmetric key encryption and asymmetric key encryption.

For symmetric key encryption, both parties should have a consensus about a secret encryption key. When A wants to send a message to B, A uses the secret key to encrypt the message. After receiving the encrypted message, B uses the same (or derived) secret key to decrypt the message.[1] The advantage of using symmetric key encryption lies in its fast encryption and decryption processes (when compared with asymmetric key encryption at the same security level). The disadvantages are, first, the encryption key must be exchanged between two parties in a secure way before sending secret messages. Secondly, we must use different keys with different parties. For example, if A communicates with B, C, D and E, A should use 4 different keys. Otherwise, B will know what A and C as well as A and D has been talking about. The drawbacks of symmetric key encryption make it unsuitable to be used in the Internet, because it's difficult to find a secure way to exchange the encryption key.

For asymmetric key encryption, there is a pair of keys for each party: a public key and a private key. The public key is freely available to the public, but only the key owner gets hold of the private key. Messages encrypted by a public key can only be decrypted by its corresponding private key, and vice versa. When A sends message to B, A first gets B's public key to encrypt the message and sends it to A. After receiving the message, B uses his private key to decrypt the message. The advantage comes in the public key freely available to the public, hence free from any key exchange problem. The disadvantage is the slow encryption and decryption process. Almost all encryption schemes used in the Internet uses asymmetric key encryption for exchanging the symmetric encryption key, and symmetric encryption for better performance.[2] Asymmetric key cryptography seems to attain secrecy in data transmission, but the authentication problem still exists. Consider the following scenario: when A sends a message to B, A gets B's public key from the Internet——but how can A know the public key obtained actually belongs to B? Digital certificate emerges to solve this problem.

Authentication

Digital certificate is an identity card counterpart in the computer society. When a person wants

to get a digital certificate, he generates his own key pair, gives the public key as well as some proof of his identification to the Certificate Authority (CA). CA will check the person's identification to assure the identity of the applicant. If the applicant is really the one "who claims to be", CA will issue a digital certificate, with the applicant's name, e-mail address and the applicant's public key, which is also signed digitally with the CA's private key. [3] When A wants to send B a message, instead of getting B's public key, A now has to get B's digital certificate. A first checks the certificate authority's signature with the CA's public key to make sure it's a trustworthy certificate. Then A obtains B's public key from the certificate, and uses it to encrypt message and sends to B.

Authentication is an important part of everyday life. The lack of strong authentication has inhibited the development of electronic commerce. It is still necessary for contracts, legal documents and official letters to be produced on paper. Strong authentication is then, a key requirement if the Internet is to be used for electronic commerce. Strong authentication is generally based on modern equivalents of the one time pad. For example tokens are used in place of one-time pads and are stored on smart cards or disks.

Firewall

Since the advent of the Internet and computer network security, many people have sought for firewall.[4] The constant threat of the "hacker" and "cracker" has never been so acknowledged. With the business need for being able to conduct Electronic Commerce on the Internet safely, it should led the industry toward the construction of the perfect firewall. Many software and hardware devices have been constructed to prevent the breaching of the precious critical data. Companies have invested hundreds of thousands of dollars in time, material and personnel to create firewall systems that would protect them from violation.

In order to provide some level of separation between an organization's Intranet and the Internet, firewalls have been employed. A firewall is simply a group of components that collectively form a barrier between two networks.

The firewall device is a security system for connecting a computer network to other computer network. The security device has a pair of computer motherboard, each of which has single or multiple networks interface adapter for receiving and transferring communications from a computer network to the other computer network.[5] The firewall is a designed specifically as a security system for preventing unauthorized communications between one computer network and another computer network, and more specifically for preventing unauthorized access to a private computer network from a public computer network such as the Internet. Firewalls could operate on the network operating systems of today and tomorrow and use the present and newly developed client operating systems.

Key Words

aggressive	侵略的，进取的
anecdotal	轶事的
attain	达到，获得

authentication	认证，证明，鉴定
barrier	障碍，栅栏
compound	复合的，混合的
consensus	合意，一致
coverage	覆盖的范围
cryptography	密码系统，密码术
decrypt	解密，解释明白
deepen	深化
encryption	加密术，密码术
firewall	防火墙
glean	收集
increasingly	逐渐地，渐增的
inspection	检查，视察
mere	仅仅的，只不过的
pad	填补
scenario	想定，游戏的关或特定情节
shipment	装船，出货
signature	签字，签名，署名
strategic	战略上的
undetected	未被发现的
unprecedented	空前的
unsuitable	不适合的
violation	违反，违背
widespread	流传广的

Notes

[1] After receiving the encrypted message, B uses the same (or derived) secret key to decrypt the message.

“After receiving the encrypted message”是时间状语从句。

译文：B 收到加密的消息后，用相同的（或最初的）密钥将消息解密。

[2] Almost all encryption schemes used in the Internet uses asymmetric key encryption for exchanging the symmetric encryption key, and symmetric encryption for better performance.

asymmetric key encryption 是指“非对称密钥加密”，symmetric key encryption 是指“对称密钥加密”。

译文：在互联网中几乎所有的加密方案都使用非对称密钥加密来替换对称加密密钥和对称加密，以得到更好的性能。

[3] If the applicant is really the one “who claims to be”, CA will issue a digital certificate, with the applicant’s name, e-mail address and the applicant’s public key, which is also signed digitally with the CA’s private key.

CA 指“证书授权机构”，是可信任的第三方，它保证数字证书的有效性。CA 负责注册、

颁发证书，并在证书包含的信息变得无效后删除（收回）证书。

译文：如果申请人确如自己所声称的，证书授权机构将授予带有申请人姓名、电子邮件地址和申请人公钥的数字证书，并且该数字证书由证书授权机构用其私有密钥作了数字签名。

[4] Since the advent of the Internet and computer network security, many people have sought for firewall.

本句由“Since”引导原因状语从句。

译文：自从互联网问世和网络安全的需要，许多人都在寻找防火墙。

[5] The security device has a pair of computer motherboard, each of which has single or multiple networks interface adapter for receiving and transferring communications from a computer network to the other computer network.

本句的“each of which …”是定语从句，修饰“computer motherboard”。

译文:这套安全装置有一对计算机主板,每块主板上都有一个或多个网络用户接口适配器，用于从一个计算机网络到另一个计算机网络间接收和传送通信信息。

4.4.2 Exercises

1．Translate the following phrases into English

（1）公开密钥

（2）非授权通信

（3）防火墙设备

（4）传统通信

（5）非对称密钥

（6）证书授权机构

（7）私有密钥

（8）数字认证

2．Translate the following phrases into Chinese

（1）up-to-date

（2）distrusted network

（3）symmetric key encryption

（4）security level

（5）fear about

（6）legal documents

（7）unauthorized access

（8）security device

3．Identify the following to be True or False according to the text

（1）Symmetric key encryption and asymmetric key encryption are almost the same.

（2）The more people use Internet, the more concerns about Internet Security.

（3）The constant threat of the “hacker” and “cracker” has been so acknowledged.

（4）Firewalls could operate on the network operating systems of today and tomorrow, but they could not use the present and newly developed client operating systems.

（5）The firewall can offer great “wire speeds” within the firewall.

（6）Asymmetric key encryption is the way to solve the data security problem.

（7）The advantage of using symmetric key encryption lies in its fast encryption and decryption processes.

（8）The firewall device is a security system for connecting a computer network to other computer network.

4．Reading Comprehension

（1）we get up-to-date information through web and we do shopping in the _____.

a．supermarket

b．grocery

c．cybermarket

d．book store

（2）For_____, there is a pair of keys for each party: a public key and a private key.

a．asymmetric key encryption

b．symmetric key encryption

c．firewall

d．digital certificate

（3）A good firewall demands a new generation of super speed devices that can handle easily _____packets on each port every second.

a．5.2 million

b．3.3 million

c．9.6 million

d．1.5 million

（4）The firewall device is a _____ for connecting a computer network to other computer network.

a．computer system

b．security system

c．communicate system

d．file system

4.4.3 Reading Material

Computer Security

Hardware, software, and data are the major assets of computer systems, computer security concerns with them. If there is malicious destruction of a hardware device, erasure of a program or data file, or failure of an operating system file manager, it cannot find particular disk file. In addition, an interception—some unauthorized party has gained access to an asset. There are eliciting copying of program or data files, or wiretapping to obtain data in a network. While a loss may be discovered fairly quickly, a silent interceptor may leave no traces by which the interception can be readily detected. An unauthorized party not only accesses but tampers with an asset. Someone might modify

the values in a database, alter a program so that it performs an additional computation, or modify data being transmitted electronically. It it even possible for hardware to be modified. Some cases of modification can be detected with simple measures, while other more subtle changes may be almost impossible to detect. The intruder may wish to add spurious transactions to a network communication system, or add records to an existing database, this is fabrication of an unauthorized party.

There is an urgent need for computer security. Computer owners must take steps to prevent theft and inappropriate use of their equipment. Computer users should be required to provide positive identification and computer access should be controlled.

Today, most computer facilities have some sort of security system. These facilities have means of confirming the identities of persons who want to use the system, so that unauthorized users do not gain access. Usually, authorized users are issued special cards, keys, passwords, or account numbers. In elementary school and high schools, this identification system may consist of a simple list of names. Each person on this list has a key that provides access to a computer room with bolted-down machines. Unfortunately, some users lend their keys and share their password. Often, when computer users are allowed to choose their passwords, they choose easy-to remember and easy-to-guess passwords.

One way to avert these problems is to assign access codes that are read by the computer from pass cards. The user does not have to remember this number, so that number can be complex. Even if the card is stolen, the code can be changed when the theft is reported.

Another security problem concerns the protection of the operating system and data on the computer. It is essential that security measures protect all operating system. Unscrupulous individuals have found ways to circumvent the system to print out a list of passwords, give themselves access rights, they are not officially assigned, and spread viruses. For these reasons, all sensitive data should be stored and locked up when, not in use. Some large companies use data encryption to store data in a scrambled form, meaningless to anyone without a special data item called a key.

Computer viruses are bits of code that damage or erase information, files, or software programs in your computer. A computer virus is a computer program that can infect other computer programs by modifying them in such a way as to include a (possibly evolved) copy of it. Much like viruses that infect humans, computer viruses can spread. Your computer can catch a virus when you download an infected file from the Internet or copy an infected file from a diskette. Once the virus is embedded into your computer’s files, it can immediately start to damage or destroy information, or it can wait for a particular date or event to trigger its activity.

Some viruses consist of the file infected which attach themselves to ordinary program files. These usually infect arbitrary .COM and/or .EXE programs, though some can infect any program for which execution is requested, such as .SYS, .OVL, .PRG, .MNU files. The other viruses are systems or boot—record injectors: these viruses, which infect executable code, found in certain system areas on disk that are not ordinary files.

Unit 5 Electronic-Commerce Knowledge

5.1 Electronic-Commerce

5.1.1 Text

Electronic-commerce (EC) is doing business through electronic media. It means using simple, fast and low-cost electronic communications to transact, without face-to-face meeting between the two parties of the transaction.

High-speed network makes geographical distance insignificant. Businesses can sell goods to customers outside traditional markets, explore new markets and realize business opportunities more easily. Businesses can maintain their competitive advantage by establishing close contact with their customers and consumers at anytime through Internet by providing the latest information on products and services round the clock[1]. Internet provides companies with many markets in the cyberworld and numerous chances for product promotion. Besides, relationships with buyers can also be enhanced. By the use of multimedia capabilities, corporate image, product and service brand names can be established effectively through the Internet.

The definition of electronic commerce

Different scholars define electronic commerce in different way.

Marilyn Greentein and Todd M. Feinman define electronic commerce as the use of electronic transmission mediums (telecommunications) to engage in the exchange, including buying and selling, of products and services requiring transportation, either physically or digitally, from location to location.

Kalalota and Whinston define EC from perspectives below.

From a communications perspective, EC is the delivery of information, products/services, or payments over telephone lines, computer networks, or any other electronic means.

From a business process perspective, EC is the application of technology toward the automation of business transactions and work flow.

From a service perspective, EC is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.[2]

From an online perspective, EC provides the capability of buying and selling products and information on the Internet and other online services.

Lou Gerstner, IBM’s CEO: “E-Business is all about cycle time, speed, globalization, enhanced productivity, reaching new customers and sharing knowledge across institutions for competitive advantage.”

Li Qi, a professor and expert in this field, defines EC from the perspective of productive force.[3] He thinks there should be two definitions. The broader definition is that electronic commerce is the use of electronic tools in commercial activities. The narrower definition is that electronic commerce is the whole process in which people, who master information technology and business regulations and rules, systematically use electronic tools and efficiently and low-costly engage in all kinds of activities centering on the exchange of commodities and services in a highly technically and economically advanced society.[4] The first definition can be simplified as commercial electronic application; the second can be shortened as electronic commercial system.

Classification of the EC field by the nature of the transactions

A common classification of EC is by the nature of transaction. The following types are distinguished:

Business-to-business (B2B). Most of EC today is of this type. It is the electronic market transactions between organizations.

Business-to-consumer (B2C). There are retailing transactions with individual shoppers. The typical shopper at Amazon.com is a consumer, or customer.

Consumer-to-consumer (C2C). In this category, consumer sells directly to consumers. Examples are individuals selling in classified ads and selling residential property, cars, and so on. Advertising personal services on the Internet and selling the knowledge and expertise is another example of C2C. Service auction sites allow individuals to put items up for auctions finally, many individuals are using Intranets and other organizational internal networks to advertise items for sale or services.

Consumer-to-business (C2B). This category includes individuals who sell products or services to organizations, as well as individuals who seek sellers, interact with them, and conclude a transaction.

Internet electronic-commerce security

There are numerous threats to the security of Internet electronic-commerce. Security breaches are most frequently discussed in terms of the Internet and the danger that hackers will intercept messages, misuse the information or modify the content of the message. The Internet is only one potential source of insecurity; there’re further elements of the problem below.

The customer side: A customer can be impersonated, with or without the use of the customer’s equipment. The use of stolen credit card details is the simplest example.

The vendor site: The vendor can trade inappropriately or dishonestly. Problems can range from customer details being stolen from the vendors files to bogus traders who set-up online and take money with no intention of supplying the advertised goods or services.

The security issues, across the network and at both ends, fall into a number of categories.

1．Confidentiality

When a message is sent electronically, the sender and receiver may desire that the message remain confidential, and thus not be read by any other parties. Thus the message must be made

un-interpretable to everyone except the designated receivers, so as to give an electronic message the property of confidentiality.[5]

2. Authentication

When an electronic message is received by a user or a system, the identity of the sender needs to be verified in order to determine if the sender is who he claims to be. To identify a user, at least one of the following types of information is generally required: something you have (e.g., a token); something you know (e.g., a PIN); or something you are (e.g., fingerprints or signatures).

3. Integrity

A message that has not been altered in any way, either intentionally or unintentionally, is said to have maintained its integrity. For electronic commerce, verifying that the order details sent by the purchaser have not been altered is one major security concern. Trading partners electronically sharing design specifications need assurance that the design specifications sent by the customer to their supplier, or vice-versa, have not been altered in anyway during their electronic transmission.

4. Non-Repudiation

The term repudiation means to refuse to accept as having rightful authority or obligation, as in refusing to pay a debt because one refuses to acknowledge that the debt exists. For business transactions, unilateral repudiation of a transaction by either party is unacceptable and can result in legal action. Well-designed electronic commerce systems provide for non-repudiation, which is the provision for irrefutable proof of the origin, receipt, and contents of an electronic message. Companies engaged in electronic commerce are often vulnerable to non-repudiation risks.

Legal issues in electronic-commerce

Electronic-commerce is so new that the legal, ethical, and other public policy issues that are necessary for electronic-commerce's existence are still evolving. Many legal loopholes can be fixed only after the incident occurred.

Businesses operating on the Web face two additional complicating factors as they try to comply with the law. First, the Web extends a company's reach beyond traditional boundaries. A business that uses the Web immediately becomes an international business. Thus, a company can become subject to many more laws more quickly than a traditional brick-and-mortar business based in one specific location. Second, the Web increases the speed and efficiency of communications. Customers often have much more interactive and complex relationships with online merchants than they do with traditional merchants. Further, the Web creates a network of customers who often have significant levels of interaction with each other. Web businesses that violate the law or breach ethical standards can face rapid and intense reactions from many customers and other stakeholders who become aware of the businesses' activities.

We have segregated the electronic-commerce related legal issues to include:

Privacy. This issue is becoming the most important issue for consumers. And indeed, privacy statements can be found today in most large electronic-commerce related Web sites.

Intellectual property. Protecting intellectual property on the Web is very difficult since it is easy and inexpensive to copy and disseminate digitized information. Furthermore, it is very difficult to

monitor who is using intellectual property and how.

Free speech. The Internet provides the largest opportunity for free speech that has ever existed. Yet, this freedom may offend some people. Again, the line is not always clear between what is illegal and what is unethical.

Taxation. At the present time, it is difficult to impose new sales taxes on Internet business. A possible collision between tax laws of different countries is possible.

Consumer protection. Many legal issues that deal with consumer protection, ranging from misrepresentation to different kinds of fraud, are related to electronic trade.

Key Words

auction	拍卖，标售
bogus	伪造的，假的
commodity	商品，便利，利益
confidentiality	私密性，机密性
consumer	消费者，用户
customer	客户，买主
dishonestly	不诚实的，不可靠的
disseminate	散播，传播，普及
ethical	道德的，伦理的
fingerprint	指纹
fraud	欺骗，舞弊
globalization	全球化
impersonate	模仿，假冒
inappropriately	不适当的，不相宜的
integrity	完整，完全
intentionally	有意的，故意的
irrefutable	无可辩驳的，驳不倒的
loophole	漏洞，欺骗性圈套
misrepresentation	误传，曲解
misuse	误用，滥用
obligation	契约，债务，合约，责任
perspective	远景，观点，眼界
purchaser	买主，购买人
receipt	收据，收条
repudiation	抵赖，拒绝，推翻
segregate	分开，分离，隔开
stakeholder	利益共享者，风险共同承担者
systematically	系统地，成体系地
taxation	征税，税制，税收
unilateral	一方的，单方面的，片面的

vulnerable 脆弱的，易受伤的

Notes

[1] Businesses can maintain their competitive advantage by establishing close contact with their customers and consumers at anytime through Internet by providing the latest information on products and services round the clock.

latest information 意思是“最新信息”，round the clock 意思是“二十四小时”。

译文：通过在互联网上全天候地提供产品及服务的最新信息，商家可以与客户和消费者随时建立紧密联系来确保他们的竞争优势。

[2] From a service perspective, EC is a tool that addresses the desire of firms, consumers, and management to cut service costs while improving the quality of goods and increasing the speed of service delivery.

“From a service perspective”作状语，主句是“EC is a tool”，“that”后面的部分作定语修饰“tool”。

译文：从服务的角度来看，电子商务是一种用来满足厂商及消费者的需要，设法降低服务和管理成本，提高产品质量和加快服务速度的工具。

[3] Li Qi, a professor and expert in this field, defines EC from the perspective of productive force.

本句中的“a professor and expert in this field”是“Li Qi”的同位语。

译文：电子商务领域的专家李琪教授从生产力的角度来定义电子商务。

[4] The narrower definition is that electronic commerce is the whole process in which people, who master information technology and business regulations and rules, systematically use electronic tools and efficiently and low-costly engage in all kinds of activities centering on the exchange of commodities and services in a highly technically and economically advanced society.

这是一个长句，“that electronic commerce …”是表语从句，“who”引导的是非限定性定语，修饰“people”，“systematically…”作状语。

译文：狭义的电子商务是指在技术和经济高度发达的社会，那些掌握信息技术和商务规则及法规的人们利用电子工具，系统地、有效率地、低成本地参与到各种以交换商品和服务为中心的整个过程。

[5] Thus the message must be made un-interpretable to everyone except the designated receivers, so as to give an electronic message the property of confidentiality.

本句的“so as to…”是目的状语从句。

译文：因此除了指定的接收者之外，传输的信息必须是无法解读的，这样才能赋予电子信息的私密性。

5.1.2 Exercises

1．Translate the following phrases into English

（1）电子商务

（2）信用卡

（3）传统市场

（4）电子媒介
（5）公共政策
（6）不可抵赖
（7）在线服务
（8）隐私声明

2．Translate the following phrases into Chinese

（1）intellectual property
（2）commercial electronic application
（3）legal loopholes
（4）buying and selling products
（5）international business
（6）competitive advantage
（7）traditional merchant
（8）consumer protection

3．Identify the following to be True or False according to the text

（1）Electronic-commerce does business through electronic media.
（2）Internet provides companies with many markets in the cyberworld.
（3）With Electronic-commerce, you should not consider the network security.
（4）Companies engaged in electronic commerce are often vulnerable to repudiation risks.
（5）The Internet provides the largest opportunity for free speech that has ever existed.
（6）The typical shopper at Amazon.com is a business company.
（7）At the present time, it is easy to impose new sales taxes on Internet business.
（8）The Web creates a network of customers who often have significant levels of interaction with each other.

4．Reading Comprehension

（1）_____includes individuals who sell products or services to organizations.

a．B2B
b．C2B
c．C2C
d．B2C

（2）Customers often have much more interactive and complex relationships with online merchants than they do with_____.

a．network buyers
b．modern merchants
c．merchants
d．traditional merchants

（3）_____, EC provides the capability of buying and selling products and information on the Internet and other online services.

a．From a business process perspective
b．From a service perspective

c. From an online perspective

d. From a communications perspective

（4）When a message is sent electronically, the sender and receiver may desire that the message remain_____, and thus not be read by any other parties.

a. open

b. important

c. critical

d. confidential

5.1.3 Reading material

Role of Trust in Electronic-Commerce Success

Two factors that significantly contribute to the success of electronic-commerce are the trust people place in the online businesses and how secure they feel in transacting business on the Internet. Trust is something that has to be earned over a period of time. In the real world, trust is gained both by observing the physical structure of the organization as well as by third party recommendations. Trust brings in repeat business, an essential ingredient for success. Security is something that the businesses can strive to provide.

Trust is not easy to measure. It is developed over time. People trust a business based on their own past experience as well as by third party recommendations. In the world of online commerce the factors that significantly contribute for enhancing transaction trust are:

- Easy access to description of products and services;
- Ease of placing orders;
- Order confirmation;
- Order tracking;
- Post-sales service.

These qualities support our working definition for trust. Thus, customers want to feel good about each and every one of these aspects before they form the opinion that the business is trustworthy. All electronic-commerce must facilitate trust building in a variety of ways.

A tree-structured design of the organization’s products and services will enable easy navigation for the customer. There are numerous tools available for Web design to make the site attractive and easy to navigate. Taking advantage of database tools, an organization can easily bring to the Web real time data such as quantity on hand.

Today, there are several third party vendors who provide the Web cart facility. Technology today can easily facilitate the order confirmation. The most common way this is handled today via e-mail. Since shipping takes place via an independent carrier, order-tracking information usually comes later. This is not a drawback as long as the order tracking information is linked to the order history. The best thing about the order tracking aspect is that the shipper handles this aspect fully. In order to achieve success in building trust the organization should be partner with the shipper in sharing information.

Post-sales service is a key component in earning customer loyalty and trust. In electronic-commerce, a customer is most likely separated by distance from the merchant and at the same time has access to the merchant's Web site around the clock. This is the time asymmetry forces electronic-commerce to rely on its information systems to facilitate post-sales service such as return of merchandise. Any bottleneck in this aspect will be a major factor in losing trust.

Many online businesses are unknown to customers. Yet, they have an interest in doing business with the online company because the product or service has a beneficial aspect to the customer. Their primary concern is the lack of knowledge about the business. On the other hand, they have trust in large financial institutions. So they use the financial institution's intermediary role in guaranteeing payment to the merchant and at the same time assuring customers that their satisfaction is paramount. Financial institutions like First Virtual collect the cost of the order from the customer and hold it in escrow for a set period. The merchant is satisfied that the customer has paid for the order. Customers are satisfied that if the ordered item did not meet their expectations then they have a reliable intermediary to mediate.

Their intermediary role involves conflict resolution and customer satisfaction. They have to build the necessary information infrastructure in order to perform this intermediary role. They get their exposure to the customers by means of other trusted organizations such as the Better Business Bureau whose seal they are authorized to use.

5.2 Electronic Data Interchange

5.2.1 Text

Electronic Data Interchange (EDI) is used by organizations for transactions that occur on a regular basis to a pre-determined format. EDI is most commonly applied in the execution and settlement phases of the trade cycle. In execution of a simple trade exchange, the customer's order can be sent by EDI and the delivery notification from the supplier can also be electronic. For settlement the supplier can use EDI to send the invoice and the customer can finish the cycle with an electronic funds transfer via the bank and an EDI payment notification to the supplier.[1] This whole cycle may be more complex and other electronic messages can be included.

More formally EDI is described as the interchange of structured data according to agreed message standards between computer-computer systems, by electronic means.[2] Structured data equates to an unambiguous method of presenting the data content of a document, be it an invoice, order or any other document type. The method of ensuring the correct interpretation of the information by the computer system is defined by the standard. Electronic exchange of information in the context of pure EDI effectively means without human intervention.

In theory, trading partners may perform EDI directly, from one computer to another. In practice, EDI is more easily done through an intermediary called a value-added network or "VAN". The VAN serves as an electronic clearinghouse or post office, routing messages between trading partners and holding them until the recipient is ready for them.

EDI messages, known as "transaction sets", are arranged in formats determined by members of

the EDI community-typically businesses. Each industry represented creates the transaction sets it needs. For example, the health care industry has transaction sets for patient records and insurance claims. The standard for EDI in the United States, ANSI X12, defines hundreds of transaction sets for dozens of industries.

The hardware requirements of EDI

EDI does require a computer and network. More difficult perhaps known what sort of computer. EDI works from nearly any computer (PC and mainframe), regardless of what your trading partner uses, because EDI is hardware independent. EDI standards take care of that. Your choice of hardware, though, can determine how EDI integrates with, complements, or impedes your current and future operations.

Because you will most likely transmit your EDI transactions by modem over telephone lines, it is in your best interests to purchase the fastest modem you can, measured by the “baud rate” the number of characters per second the modem can transmit.[3] You should consider this, even if your modem’s speed outstrips that of your VAN, or even that of the Phone Company in some areas.[4] Even if you can transmit faster than it can receive, in all likelihood it will improve their capabilities to stay competitive with its competition. It will grow into your capability. And you will save money in the long run by buying only one modem instead of two. If you plan to transmit all your transactions overnight to take advantage of lower rates, modem speed is less of an issue. Consider also the human resources available: who will take care of your system? If you have mainframe people, you may want to go with mainframe EDI to avoid retraining, although software and communications costs will likely be significantly higher than for a PC-based solution.

The software requirements of EDI

Translation software is one of the two major types of software involved in EDI, and the more important of the two. Without the translator, there is no EDI. At the transmitting end, the translator takes raw data and arranges it into the X12 standard format. The sender of an EDI transaction does not generally convert the transaction into his EDI software but, rather, uses a translator to convert the existing data into the form of the EDI transaction set. At the receiving end, the recipient reverses the process to extract the needed information from the EDI transmission and place it into his applications. This is one of the reasons that standardization is so important. It lets the translator know what information it needs, where to find it, and what to do with it. Some VANs offer this translator as part of their service, while others do not.

Mapping software is the other major branch of EDI software. It exchanges information between a company’s EDI transactions and its other applications, such as accounting, inventory, and ordering. Many find mapping to be the hard part of EDI because it takes considerable skill and patience to map data successfully between disparate applications. Mapping is what makes EDI such a powerful tool because it allows the information to flow freely, accurately, and automatically. Mapping is what really allows businesses to exploit the capabilities of EDI to their advantage.

The benefits of EDI

EDI can bring a number of advantages to the organizations that use it. It should save considerable time on the exchange of business transactions and has the potential for considerable savings in costs.

1. Shortened Ordering Time

Paper orders have to be printed, enveloped and sent out by the customer's post room, passed through the postal service, received by the supplier's post room and input to the supplier's order processing system. To achieve all this, reliably, in less than three days would be to do very well. EDI orders are sent straight into the network and the only delay is how often the supplier retrieves messages from the system. Orders can be in the supplier's system within a day, or if there is urgency the messages can be retrieved more frequently, for example every hour.

2. Cost Cutting

The use of EDI can cut costs. These include the costs of stationery and postage but these will probably be fully matched by the costs of running the EDI service. The principle saving from the use of EDI is the potential to save staff costs. The obvious example of this is that if the orders are directly input to the system there is no need for an order entry clerk. Note also that seasonal peaks, staff holidays, etc., no longer create a backlog in the order entry area. The cost savings need to be offset against the system development and network costs.

3. Elimination of Errors

Keying any information into a computer system is a source of errors and keying paper orders into the order processing system is no exception. EDI eliminates this source of errors. On the down side, there is no order entry clerk who might have spotted errors made by the customer, the customer will get what the customer asked for.

4. Fast Response

With paper orders it would be several days before the customer was informed of any supply difficulty, such as the product is out of stock. With EDI the customer can be informed straightaway giving time for an alternative product to be ordered or an alternative supplier to be used.

5. Accurate Invoicing

Just like orders, invoices can be sent electronically. EDI invoices have similar advantages to EDI orders in saved time and avoided errors. However, the major advantage in EDI invoices is that they can be automatically matched against the original order and cleared for payment without the sort of queries that arise when paper invoices are matched to orders.

6. EDI Payment

Payment can also be made by EDI. The EDI payment system can also generate an EDI payment advice that can be electronically matched against the relevant invoices, again avoiding query and delay.[5]

Indirect advantages of the use of EDI can include reduced stock holding, improvement of cash flow, business opportunities and customer lock-in.

To gain these advantages EDI has to be seen as an investment—there are costs upfront and the payback is longer term. The costs are the set up of the EDI system (hardware, software and network)

and the time required to establish agreements with trading partners.

Key Words

accounting	会计，账，记账，清算账目
competition	竞争，比赛
envelope	信封，包封
extract	抽出，提取
impede	妨碍，阻碍，阻止
insurance	安全保障，保险
interchange	交换，互换
intervention	介入，调停，干涉
inventory	报表，目录，盘存
outstrip	超过，越过，优于
postage	邮费，邮资
potential	可能的，潜在的
recipient	接受者，接受的，容纳的
relevant	有关的，适当的
reverse	使颠倒，相反，交换
settlement	解决，整理，结算，清理
stationery	信纸
straightaway	直接
unambiguous	不含糊的，明确的
upfront	最前面的，首要的

Notes

[1] For settlement the supplier can use EDI to send the invoice and the customer can finish the cycle with an electronic funds transfer via the bank and an EDI payment notification to the supplier.

“for settlement”是状语，之后是由“and”连接的两个并列句。

译文：至于结算，供应商可以使用 EDI 来传发票，客户可以在银行通过对供应商的付款通知和使用电子转账完成最后的环节。

[2] More formally EDI is described as the interchange of structured data according to agreed message standards between computer-computer systems, by electronic means.

“more formally”是状语，“interchange”后面的部分是定语，“by electronic means”作状语。

译文：更正式的对 EDI 的描述是：依照计算机系统间的协议标准、用电子手段进行结构数据的交换。

[3] Because you will most likely transmit your EDI transactions by modem over telephone lines, it is in your best interests to purchase the fastest modem you can, measured by the “baud rate” the number of characters per second the modem can transmit.

“because”引起原因状语从句，“it”是形式主语，真正的主语是不定式结构“to

purchase…”，“measured by …”是主语补足语。

译文：你极可能会通过电话线用调制解调器进行 EDI 业务传送，购买尽可能高速的调制解调器，以符合你的最大利益，它是用速率来衡量的，即每秒调制解调器传送的字符数。

[4] You should consider this, even if your modem’s speed outstrips that of your VAN, or even that of the Phone Company in some areas.

本句中由“even if”是让步状语从句。

译文：你应该考虑到这点，即使它的速率超过 VAN 或某地区电话公司的速率。

[5] The EDI payment system can also generate an EDI payment advice that can be electronically matched against the relevant invoices, again avoiding query and delay.

本句由“that”引导定语从句，修饰宾语“an EDI payment advice”。

译文：EDI 支付系统也生成 EDI 付款意见，可以以电子的方式与有关发票相匹配，亦可避免疑问和延迟。

5.2.2 Exercises

1．Translate the following phrases into English

（1）电子数据交换

（2）订单处理系统

（3）增值网

（4）交易伙伴

（5）硬件无关的

（6）结构化数据

（7）映射软件

（8）波特率

2．Translate the following phrases into Chinese

（1）health care industry

（2）Phone Company

（3）stock holding

（4）human resources

（5）trade cycle

（6）paper order

（7）translation software

（8）postal service

3．Identify the following to be True or False according to the text

（1）The standard of ANSI X12 for EDI defines hundreds of transaction sets for dozens of industries.

（2）With paper orders it would be only one day before the customer was informed of any supply difficulty.

（3）Mapping is what really allows businesses to exploit the capabilities of EDI to their advantage.

（4）EDI invoices have similar advantages to EDI orders in saved time and avoided errors.

（5）In practice, EDI is more easily done through an intermediary called LAN.

（6）The use of EDI can not cut costs.

（7）Payment can not be made by EDI.

（8）EDI can bring a number of advantages to the organizations that use it.

4．Reading Comprehension

（1）EDI messages, known as “transaction sets”, are arranged in formats determined by members of the _____.

a．EDI community

b．suppliers

c．network companies

d．Internet and EDI

（2）_____exchanges information between a company’s EDI transactions and its other applications, such as accounting, inventory, and ordering.

a．EDI software

b．Software

c．Mapping software

d．Translation software

（3）EDI orders are sent straight into the _____and the only delay is how often the supplier retrieves messages from the system.

a．company

b．network

c．mainframe

d．software

（4）The method of ensuring the correct interpretation of the information by the computer system is defined by the _____.

a．standard

b．commerce

c．company

d．supplier

5.2.3 Reading material

Digital Wallet

New technology has made it possible to pay for goods and services over the Internet. Some of the methods would link existing electronic banking and payment systems, including credit and debit card networks, with new retail interfaces via the Internet. “Electronic money”, based on stored-value, smart card, or other technologies, is also under development. Substantial private sector investment and competition is spurring an intense period of innovation that should benefit consumers and businesses wishing to engage in global electronic commerce.

A number of organizations are already working on important aspects of electronic banking and

payments. Their analyses will contribute to a better understanding of how electronic payment systems, and will affect global electric commerce and banking. As electronic payment systems develop, governments should work closely with the private sector to inform policy development, and ensure that governmental activities flexibly accommodate the needs of the emerging marketplace.

A digital wallet is software that enables users to pay for goods on the Web. It holds credit card numbers and other personal information such as a shipping address. Once entered, the data automatically populates order fields at merchant sites.

When using a digital wallet, consumers don't need to fill out order forms on each site when they purchase an item because the information has already been stored and is automatically updated and entered into the order fields across merchant sites. Consumers also benefit when using digital wallets because their information is encrypted or protected by a private software code. And merchants benefit by receiving protection against fraud.

Digital wallets are available to consumers free of charge, and they are fairly easy to obtain. For example, when a consumer makes a purchase at a merchant site that is set up the server-side digital wallets, he types his name and payment and shipping information into the merchant's own form. At the end of the purchase, the consumer is asked to sign up for a wallet of his choice by entering a user name and password for future purchases. Users can also acquire wallets at a wallet vendor's site.

Although a wallet is free for consumers, vendors charge merchants for wallets. Digital wallets come in two main types: client-side and server-side. Within those divisions are wallets that work only on specific merchant sites and those that are merchant agnostic.

Client-based digital wallets, the older of the two types, are falling by the wayside, according to analysts, because they require users to download and install software. A user need to download the wallet application and input payment and mailing information. At that point, the information is secured and encrypted on the user's hard drive. The user retains control of his credit card and personal information locally.

With a server-based wallet, a user fills out his personal information, and a cookie is automatically downloaded. (A cookie is a text file that contains information about the user.) In this scenario, the consumer information resides on the server of a financial institution or a digital wallet vendor rather than on the user's PC.

Server-side wallets provide assurance against merchant fraud because they use certificates to verify the identities of all parties. When a party makes a transaction, it presents its certificate to the other parties involved. A certificate is an attachment to an electronic message used to verify the identity of the party and to provide the receiver with the means to encode a reply. Furthermore, the cardholder's sensitive data is typically housed at a financial institution, so there is an extra sense of security because financial environments generally provide the highest degree of security. But even though wallets provide easy shopping online, adoption has not been widespread. Standards are pivotal to the success of digital wallets.

5.3 Advertising Methods on the Web

5.3.1 Text

Advertising is an attempt to disseminate information in order to effect a buyer-seller transaction. The Internet redefined the meaning of advertising. The Internet has enabled consumers to interact directly with advertisers and advertisements. In interactive marketing, a consumer can click with his or her mouse on an ad for more information or send an e-mail to ask a question. The Internet has provided the sponsors with two-way communication and e-mail capabilities, as well as allowing the sponsors to target specific groups on which they want to spend their advertising dollars, which is more accurate than traditional telemarketing.[1] Finally, the Internet enables a truly one-to-one advertisement.

1．Why Internet advertisement is growing

There are several reasons why companies advertise on the Internet. To begin with, television viewers are migrating to the Internet. The media follows, acknowledging that the goal of any advertiser is to reach its target audience effectively and efficiently. Advertisers recognize that they have to adapt their marketing plans to account for the ever-growing number of people spending increasing amounts of time online, frequently at the expense of other media.

The migration of so many from television seems very impressive. Add to this the fact that the Internet users are well educated with high incomes, it is only logical to conclude that Internet surfers are a desired target for advertisers.

Other reasons why Web advertising is growing rapidly are:

- Ads can be updated any time with a minimal cost. Therefore, they are always timely.
- Ads can reach very large numbers of potential buyers globally.
- Online ads are sometimes cheaper in comparison to television, newspaper, or radio. The latter are expensive since they are determined by space occupied, how many days (times) they are shows, and on how many national and local television stations and newspapers they are posted.
- Web ads can efficiently use the convergence of text, audio, graphics, and animation.
- The use of the Internet itself is growing very rapidly.
- Web ads can be interactive and targeted to specific Internet groups and individuals.

These characteristics began to convince large consumer products companies to shift an increasing amount of advertising dollars away from traditional media to Web advertisement.[2]

2．Some of the major methods used for advertisements

（1）Banners

Banner advertising is the most commonly used form of advertising on the Internet. As you surf your way through the information superhighway, banners are everywhere. The file size of the image should be about 7KB to 10KB. The smaller the file size, the quicker it loads. Designers of banners pay a lot of attention to the size of the image because long downloading times may cause a viewer to become impatient and move on before the banner is fully displayed.[3] Typically, a banner contains a short text or graphical message to promote produce. Advertisers go to great lengths to design a

banner that catches consumers' attention.

With the progress of Internet programming we are starting to find banners with video clips and sound. Banners contain links that, when clicked on, transfer the customer to the advertiser's home page. There are two types of banners: keyword banner and random banner. Keyword banners appear when a predetermined word is queried from the search engine. It is effective for companies who want to narrow their target audience. Random banners appear randomly. Companies that want to introduce their new products use random banners.

A major advantage of using banners is the ability to customize them to the target audience. One can decide which market segments to focus on. Banners can even be customized to one-to-one targeted advertisement. Also, "forced advertising" marketing strategy is utilized, which means customers are forced to see it. The disadvantages are high overall cost. If a company demands a successful marketing campaign, it will need to allocate a large percentage of the advertising budget to acquire a high volume of CPM.

There are several different forms of placing banner advertising on the Internet on others' Web sites. The most common forms are: Banner Swapping， Banner Exchanges, and Paid Advertising. Banner swapping means that company A aggress to display a banner of company B in exchange for company B displaying company A's ad. It is a direct link between Web sites. This is probably the least expensive form of banner advertising to establish and maintain, but it is also difficult to arrange. Frequently banner swapping does not work because a match is not possible. If there are several companies involved, however, a multi-company match may be easier to find.[4] Banner exchange organizations arrange for a trading of three or more partners. Paid advertisement means purchasing banner ad space on the Internet. It is similar to buying ad space in other media.

（2）Splash screen

A splash screen is an initial Web site page used to capture the user's attention for a short time as a promotion or lead-in to the site home page or to tell the user what kind of browser and other software they need to view the site. The major advantage of a splash page over any other advertising method is that one can create innovative multimedia effects or provide sufficient information for a delivery in one visit.

（3）Spot leasing

Search engines often provide space (spot) in their home page for any individual business to lease. The duration of the lease depends upon the contract agreement between the Web site host and the lessee. Unlike banners, which show up at various times, the ad place on the spot will always be there; hence, competition is reduced. The disadvantage of spot leasing is that the size of the ad is often small and limited, causing some viewers to miss the ad. Also, the cost can be very high.

（4）URL (Universal Resource Locators)

The major advantage of using URL as an advertising tool is that it is free. Anyone can submit its URL to a search engine and be listed. Also, by using URL the targeted audience can be locked and unwanted viewers can be filtered because of the keyword function. On the other hand, the URL method has several drawbacks. First, due to intense competition, a company's listing at the top of the list of a search engine can easily be replaced by others. Moreover, different search engines index

their listings differently.

（5）E-mail

Another way to advertise on the Internet is to purchase e-mail addresses and send the company information to those on the list. The advantages of this approach are its low cost and the ability to reach a wide variety of targeted audiences. Most companies develop a customer database to whom they send e-mails. E-mail is emerging as a marketing channel that affords cost-effective implementation and better, quicker response rates than other advertising channels. A list of e-mail addresses can be a very powerful tool because you are targeting a group of people you know something about.

（6）Chat rooms

Electronic chat refers to an arrangement where participants exchange messages in real time. The software industry estimates that several hundred thousand Web sites have millions of chat rooms. A vendor frequently sponsors chat rooms. Chat capabilities can be added to a business site for free by letting software chat vendors host your session on their site. You simply put a chat link on your site and the chat vendor does the rest, including the advertising that pays for the session.[5]

Key Words

advertisement	广告
audience	听众，观众，读者
banner	旗帜，横幅标语
campaign	战役，运动
convergence	聚合，汇合
customize	定制，定做
delivery	运送，传送，交付
drawback	妨碍，障碍，弊端
effectively	有效的，生效的
impatient	急躁的，急切的，渴望的
impressive	印象深刻的，令人难忘的
innovative	革新的，创新的
lease	出租，租借
lessee	承租人，租户
migration	迁移，移动
predetermine	预定，先定，注定
redefine	再定义，重新定义
sponsor	主办人，发起者，保证人
surf	冲浪，浏览，漫游

Notes

[1] The Internet has provided the sponsors with two-way communication and e-mail capabilities, as well as allowing the sponsors to target specific groups on which they want to spend their

advertising dollars, which is more accurate than traditional telemarketing.

本句的“as well as…”作“two-way communication and e-mail capabilities”的同位语，“which”引导非限定性定于从句。

译文：互联网为广告商提供了双向通信和电子邮件的能力，同时使得广告商把广告费花到他们想针对的特定群体身上，这比传统电话营销更准确。

[2] These characteristics began to convince large consumer products companies to shift an increasing amount of advertising dollars away from traditional media to Web advertisement.

本句“to shift…”作宾语补足语。

译文:这些特征开始说服大型消费品公司把越来越多的花费在传统媒体上的费用转移到网络广告上来。

[3] Designers of banners pay a lot of attention to the size of the image because long downloading times may cause a viewer to become impatient and move on before the banner is fully displayed.

本句由“because”引导原因状语从句。

译文：因为较长的下载时间可能使得浏览者变得没有耐心，或在旗帜广告全部出现之前转移注意力，所以，旗帜广告的设计者在图像大小上付出很多心思。

[4] If there are several companies involved, however, a multi-company match may be easier to find.

本句由“If”引导条件状语从句。

译文：不过，如果有多家公司参与，多公司的匹配可能会更容易些。

[5] You simply put a chat link on your site and the chat vendor does the rest, including the advertising that pays for the session.

本句中的“and”连接两个并列的句子，“including…”是“the rest”的宾语补足语。

译文:你要做的仅仅是把聊天室链接在你的网站,聊天室软件的卖方负责其余的全部事情，包括为某一个议题的讨论而支付的广告费。

5.3.2 Exercises

1．Translate the following phrases into English

（1）随机旗帜广告

（2）网络广告

（3）弹出窗口

（4）双向通信

（5）聊天室

（6）图形信息

（7）场地租赁

（8）主页

2．Translate the following phrases into Chinese

（1）video clips

（2）target audience

（3）keyword banner

（4）user’s attention

（5）information superhighway

（6）Universal Resource Locators

（7）interactive marketing

（8）e-mail address

3．Identify the following to be True or False according to the text

（1）The Internet users are well educated with high incomes.

（2）The Internet redefined the meaning of advertising.

（3）Web ads can not be interactive and targeted to specific Internet groups and individuals.

（4）Banner exchange organizations arrange for a trading of three or more partners.

（5）The Internet does not enable a truly one-to-one advertisement.

（6）A major disadvantage of using banners is the ability to customize them to the target audience.

（7）The major advantage of using URL as an advertising tool is that it is cheap.

（8）Online ads are sometimes expensive in comparison to television, newspaper, or radio.

4．Reading Comprehension

（1）Chat capabilities can be added to a business site for free by letting _____host your session on their site.

a．suppliers

b．search engines

c．software designers

d．software chat vendors

（2）In interactive marketing, _____can click with his or her mouse on an ad for more information or send an e-mail to ask a question.

a．a lessee

b．a consumer

c．a sponsor

d．a supplier

（3）The major advantage of _____over any other advertising method is that one can create innovative multimedia effects or provide sufficient information for a delivery in one visit.

a．e-mail

b．a splash page

c．search engines

d．spot leasing

（4）_____often provide space in their home page for any individual business to lease.

a．The URL method

b．A splash screen

c．Search engines

d．Web pages

5.3.3 Reading material

Online Publishing

Online publishing is the electronic delivery of newspapers, magazines, news, and other information through the Internet. It is often related to advertisement since it is provided free in most cases, to attract people to certain sites where advertisement is conducted. Developed in the late 1960s, online publishing was designed to provide online bibliographies and selling knowledge that was stored in online databases. Publicly funded online publishing originated for the purpose of medical, educational, and aerospace research programs. Today, online publishing has different purposes. It is related to worldwide dissemination of information and to advertisement as well. The potential of new interactive technologies and other Internet applications aided the growth of online publishing.

One of the oldest examples of disseminating information by online publishing is the publishing of scholarly works for peer review. Today, online publishing is mainly used for disseminating information and for conducting sales transactions interactively. In the future, online publishing will include more customized material that the reader will receive free or pay for it.

There are a number of online newspapers available and most of them are web versions of existing newspapers. Currently access is free.

The online newspapers, it seems, are often used to look up something that has been missed in a previous issue or to look at the job advertisements, rather than being read as a newspaper. Online magazines attract some readership but they have had a hard time attracting subscriptions—there is the ethos that the net should be free and there is also a concern that the magazine might not be as good as it pretends to be or that it may not last the period of the subscription.

There is, however, a threat to conventional newspapers from the web. A large part of the revenue that pays for newspapers comes not from the cover price that the reader pays but from the money received from advertisers. The web has the potential to advertise jobs, houses and used cars at a fraction of the price of a newspaper—should the advertising of these items shift to the Web then it might not be possible to buy our daily or local newspaper, at least not at a price that the public is prepared to pay.

Online publishing includes newspapers, magazines, news, textbooks, music, artwork, video clips, and movies. Several online publishing methods are in use. They include the online archive approach, new medium approach, publishing intermediation approach, and dynamic or just-in-time approach.

The online archive approach is a digital archive such as library catalogs and bibliographic databases. It basically makes paper publications available online. The new medium approach is used by those publishers that view the Web as a medium for creating new material. This form of publishing adds extra comprehensiveness to any issue or topic that traditional magazine publishing cannot offer. One way that the new medium does this is through its ability to integrate hypertext links that offer related stories, topics, and graphics. It also can be easily customized. The new medium approach also offers up-to-date material including breaking news.

The publishing intermediation approach can be thought of as an online directory for news service. Publishing intermediation is an attempt to help people locate goods, services, and products online. Netscape provides services that are an example of this approach. The dynamic just-in-time approach is another method of online publishing. With this approach content can be created in real time and transmitted on the fly in the format best suited to the user's location, tastes, and preferences. What makes dynamic publishing so "dynamic" is its ability to customize the content transmission of its web pages to satisfy the user's preferences. The just-in-time portion of this approach refers to the ability to allow Java's applets and planned content to stream into the user's computer as they are needed and then destroy themselves once their function is no longer necessary.

Unit 6 New Technologies

6.1 Artificial Intelligence

6.1.1 Text

The concept of artificial intelligence (AI) is something which can be considered in two parts: “what is the nature of artificial” and “what is intelligence”? The first question is relatively easy to answer, although it also necessarily leads to an examination of what it is possible to manufacture. For example, the limitations of certain types of systems, such as classical computational systems, or of available manufacturing processes, or of human intellect, may all place constraints on what can be manufactured.

The second question raises fundamental ontological issues of consciousness and self and mind (including the unconscious mind). It also raises questions about the nature of intelligence as displayed by humans, as intelligent behavior in humans is complex and often difficult to study or understand. Study of animals and artificial systems which are not simply models of what already exists are also considered highly relevant.

Strong artificial intelligence research deals with the creation of some form of computer-based artificial intelligence that can truly reason and solve problems; a strong form of AI is said to be sentient, or self-aware. In theory, there are two types of strong AI.

- Human-like AI, in which the computer program thinks and reasons much like a human mind.
- Non-human-like AI, in which the computer program develops a totally non-human sentience, and a non-human way of thinking and reasoning.

Weak artificial intelligence research deals with the creation of some form of computer-based AI that can reason and solve problems only in a limited domain. Such a machine would, in some ways, act as if it was intelligent, but it would not possess true intelligence or sentience.

There are several fields of weak AI, one of which is nature language. Many weak AI fields have specialized software of programming languages created for them.

To date, much of the work in this field has been done with computer simulations of intelligence based on predefined sets of rules. Very little progress has been made in strong AI. Depending on how one defines one’s goals, a moderate amount of progress has been made in weak AI.

Much of the original focus of AI research draws from an experimental approach to psychology, and emphasizes what may be called linguistic intelligence.

Approaches to artificial intelligence that do not focus on linguistic intelligence include robotics and collective intelligence approaches, which focus on active manipulation of an environment, or consensus decision making, and draw from biology and political science when seeking models of

how “intelligent” behavior is organized.[1]

AI theory also draws from animal studies, in particular with insects, which are easier to emulate as robots, as well as animals with more complex cognition, including apes, who resemble humans in many ways but have less developed capacities for planning and cognition. AI researchers argue that animals, which are simpler than humans, ought to be considerably easier to mimic.[2] But satisfactory computational models for animal intelligence are not available.

Historically, there are two broad styles of AI research—the “neats” and “scruffies”. “Neat”, classical or symbolic AI research, in general, involves symbolic manipulation of abstract concepts, and is the methodology used in most expert systems. Parallel to this are the “scruffy”, or “connectionist”, approaches, of which neural networks are the best-known example, which try to evolve intelligence through building systems and then improving them through some automatic process rather than systematically designing something to complete the task. Both approaches appeared very early in AI history. Throughout the 1960s and 1970s scruffy approaches were pushed to the background, but interest was regained in the 1980s when the limitations of the “neat” approaches of the time became clearer. However, it has become clear that contemporary methods using both broad approaches have severe limitations.

AI research was very heavily funded in the 1980s by the Defense Advanced Research Projects Agency in the United States and by the fifth generation computer systems project in Japan. The failure of the work funded at the time to produce immediate results, despite the grandiose promises of some AI practitioners, led to correspondingly large cutbacks in funding by government agencies in the late 1980s, leading to a general downturn in activity in the field known as AI winter. Over the following decade, many AI researchers moved into related areas with more modest goals such as machine learning, robotics, and computer vision, though research in pure AI continued at reduced levels.

Whilst progress towards the ultimate goal of human-like intelligence has been slow, many spin-offs have come in the process. Notable examples include the languages LISP and Prolog, which were invented for AI research but are now used for non-AI tasks.

The basic subjects of AI include acquisition of knowledge, representation of knowledge and application of knowledge. In application domain, the research is now focusing on the subject below.

- Solutions to hard problems

Here hard problems refer to those difficult problems that they have no algorithm or whose algorithms cannot be executed in computer programs.[3] For example, route planning, electricity dispatching, stock market analysis, robot action planning, etc., and in games some problems are difficult, for example, the Tower of Hanol, peasant crossing a river, eight-numbers problems, eight-queen problem, tourist salesman problem.

- Automatic translation

Automatic translation means computer programs doing translation between two different languages. Machine translation is not simply “checking up dictionaries” and translating “word-by-word”. True translation should be based on understanding of semantics and grammar rules.

- Intelligent control and intelligent management

Intelligent control means AI technology used in control system to solve problems like complexity, incompleteness, unclearness, or uncertainty. With AI technology introduced into management system, information management system, office automation system, and decision-making supportive system, their functions and technologies can be integrated based on expert system, knowledge engineering, pattern recognition and artificial nervous element network, to form a new generation of computerized management system.

- Intelligent decision-making

With AI combined with decision-making process, expert system as an intelligent component, together with model library, method library, database and knowledge base, most intelligent decision-making systems emerge in this way.

- Intelligent simulation

Simulation refers to dynamic modeling experiment. Based on three forms of knowledge—descriptive knowledge, objective knowledge and processing knowledge, it produces another form of knowledge—conclusive knowledge. AI technology is used in the whole process of simulation including building models, practical operation and analysis of results, to direct and improve simulation models.

Many other useful systems have been built using technologies that at least once were active areas of AI research.[4] Some examples include:

1. Deep Blue, a chess-playing computer, beat Garry Kasparov in a famous match in 1997.[5]
2. Fuzzy logic, a technique for reasoning under uncertainty, has been widely used in industrial control systems.
3. Expert systems are being used to some extent industrially.
4. Neural networks have been used for a wide variety of tasks, from intrusion detection systems to computer games.
5. Handwriting recognition is used in millions of personal digital assistants.
6. Speech recognition is commercially available and is widely deployed.

The vision of AI replacing human professional judgment has arisen many times in the history of the field, in science fiction and today in some specialized areas where “expert systems” are used to augment or to replace professional judgment in some areas of engineering and of medicine.

Key Words

acquisition	取得，获得
cognition	认识，认识力
consciousness	意识，知觉
consensus	一致，合意
contemporary	当代的，现代的
cutback	削减，倒叙
dispatch	调度，派遣
downturn	向下，下降趋势

evolve	发展，形成
fiction	小说，虚构
fuzzy	模糊，不清楚的
intrusion	侵入，干扰
limitation	限制，局限性，界限
moderate	适度的，普通的
notable	显著的，著名的
practitioner	从事者，实践者
psychology	心理学，心理
semantics	语义学
unclearness	不清楚，不明白

Notes

[1] Approaches to artificial intelligence that do not focus on linguistic intelligence include robotics and collective intelligence approaches, which focus on active manipulation of an environment, or consensus decision making, and draw from biology and political science when seeking models of how “intelligent” behavior is organized.

这是一个长句，“that do not focus…”作定语，修饰主语“approaches”，“which”引导的是非限定性定语从句，修饰宾语“when”引导的是时间状语从句。

译文：近似于人工智能但并不是以语言上的智能为中心的，包括机器人学和集中智能近似，它们以动态环境处理或一致同意决策判定为中心，而且从生物学和政治方面寻求智能行为的组织模式。

[2] AI researchers argue that animals, which are simpler than humans, ought to be considerably easier to mimic.

本句的“which”引导非限定性定语从句，修饰“animals”。

译文：人工智能的研究者认为这些比人类简单的动物应该可以更加容易地模拟。

[3] Here hard problems refer to those difficult problems that they have no algorithm or whose algorithms cannot be executed in computer programs.

本句的“that”引导定语从句，修饰宾语“problems”。

译文：这里的难题是指那些根本没有算法或者算法在计算机程序中无法执行的难题。

[4] Many other useful systems have been built using technologies that at least once were active areas of AI research.

本句的“that at least…”作定语，修饰“technologies”。

译文：很多其他有用的系统的建立都利用了某些曾经是人工智能研究的活跃领域的技术。

[5] Deep Blue, a chess-playing computer, beat Garry Kasparov in a famous match in 1997.

本句的“a chess-playing computer”是“deep Blue”的同位语，“in a famous match in 1997”作状语。

译文：深蓝国际象棋比赛计算机，在 1997 年的一场著名的比赛中击败了卡斯帕罗夫。

6.1.2 Exercises

1．Translate the following phrases into English

（1）人类智能

（2）机器翻译

（3）办公自动化系统

（4）人工智能

（5）专家系统

（6）控制系统

（7）抽象概念

（8）模式识别

2．Translate the following phrases into Chinese

（1）stock market analysis

（2）classical computational system

（3）knowledge base

（4）symbolic manipulation

（5）intelligent simulation

（6）linguistic intelligence

（7）intelligent control

（8）speech recognition

3．Identify the following to be True or False according to the text

（1）Historically, there are two broad styles of AI research—the “neats” and “weak”.

（2）True translation should not be based on understanding of semantics and grammar rules.

（3）Many weak AI fields have specialized software of programming languages created for them.

（4）Expert systems are being used to some extent industrially.

（5）Satisfactory computational models for animal intelligence are available.

（6）Study of animals and artificial systems which are not simply models of what already exists are also considered highly relevant.

（7）Handwriting recognition is used in millions of personal digital assistants.

（8）Simulation does not refer to dynamic modeling experiment.

4．Reading Comprehension

（1）Human-like AI, in which the computer program thinks and reasons much like_____.

a．an animal mind

b．a human mind

c．an ape mind

d．an artificial mind

（2）Automatic translation means _____doing translation between two different languages.

a．human

b．machine

c. computer programs

d. intelligent simulator

（3）AI research was very heavily funded in the 1980s by the Defense Advanced Research Projects Agency in the United States and by the _____computer systems project in Japan.

a. fourth generation

b. sixth generation

c. third generation

d. fifth generation

（4）_____research deals with the creation of some form of computer-based artificial intelligence that can truly reason and solve problems.

a. Weak artificial intelligence

b. Intelligent control

c. Intelligent simulation

d. Strong artificial intelligence

6.1.3 Reading Material

Geographic Information Systems

Geographic information systems (GIS) are one of the fastest growing business applications. A GIS, as defined by the National Science Foundation, is a computerized database management system used for the capture, storage, retrieval, analysis and display of spatial (e.g. locationally defined) data.

A GIS consists of the following three parts.

1. GIS software.

2. Hardware. Hardware needed to run a GIS depends on three interrelated variables: (1)Scope: the number of uses, number of applications and number of users; (2)Scale of data: the more detailed the maps, the more powerful the hardware needed; (3)Functionality: the number of functions or operations to be performed on the data and the complexity of the functions.

3. Database, both internal and external.

A key in developing a GIS system is geo-coding. Geo-coding is the process of linking attribute data to maps. Street address geo-coding is the foundation technology of business geographic.

Geo-coding is much trickier to do well than it may appear. Looking up address in a directory is easy in concept but can fail due to weaknesses in software, the geo-coding reference directory or the data addresses themselves.

GIS systems allow a series of maps to be overlaid onto one another. By viewing the combination of computerized maps, a retailer could immediately see where his sales are high or low and where his competitors are strong or weak.

GIS systems allow data to be accessed in a variety of ways. Most full-function GIS systems combine three basic types of capabilities: (1) presentation mapping; (2) using maps as an organizing tool; (3) spatial analysis.

The areas GIS systems are helping businesses include: (1) real estate; (2) direct mail marketing;

(3) insurance; (4) banking; (5) service providers; (6) manufacturing; (7) transportation and distribution; (8) retailing.

There are two kinds of GIS applications on the market. “Open Systems” allow direct import of data from your spreadsheet or database programs; “Closed Systems” do not. In general, open systems offer more utility. But they are more challenging to use. The onus is on the user to prepare the attribute data for import into the GIS. Closed systems are easier to use. The attribute data arrives on your doorstep neatly bundled.

The GIS design process involves four basic elements: Geographic data; attribute data, both internal and external; mapping software; and hardware. Regarding geographical data, the first question to ask is, “What geographic area am I interested in?” Attribute data must be compatible with the GIS so it can be imported into the GIS. Mapping software should support data entry, data analysis, data output and display, and data management. As for hardware, a GIS quickly will outgrow the minimum system requirements recommended by the GIS vendor. Go for more than you need at the present time.

The non spatial, internal and external attribute data is another major cost of developing a GIS. Buying external data such as commercial demographic databases and developing internal databases can account for as much as 80% of the total cost of a GIS system.

In designing a GIS, a key concern is selecting the right attribute data for the job. In the United States, many commercial databases are based on the U.S. Census Bureau’s data. Leading vendors of commercial demographic databases use sophisticated segmentation techniques for both consumer and business data that add value to basic, raw demographic data. External data also is available at little or no cost from government agencies, trade associations, universities, nonprofit groups and other organizations.

6.2 Virtual Reality

6.2.1 Text

Virtual reality (VR) is a new technology, which emerged after the 1980s. But within several years, it had pervaded into various domains—science, technology, engineering, medicine, culture, entertainment, and its potential in application is just conspicuous.

With present achievements, using computer hardware and software and advanced sensors, researchers can generate a 3-dimensional artificial virtual environment, where you can walk around, watch in every direction and touch every object in the environment. Everything in the environment is harmoniously combined with other objects so realistically that you may feel you are in a physical environment, but really you are roaming in a virtual world.

The newly uprising VR technology has given rise to innovation in all domains. For example, people can visit and examine a building or a plane before their blueprints come out. Medical students can be trained in a VR environment so that they would not hurt the patient and the risk of operation can be reduced to minimum.[1]

The following are some real examples showing how VR technology is successfully used.

- Virtual military maneuver

In the early 1980s, the Pentagon supervised a virtual battlefield for training tank formations. It operated on a military computer network. It greatly reduced the cost for training and ensured security. After this, the Pentagon cooperated with Germany to form a network composed of 200 tank virtual training devices for soldiers deployed in different places to join the training simultaneously. In practical combats, tanks, armored vehicles, helicopters, cannons join in coordinated military actions, under uniform command. To perform such realistic training is costly, so that in the late 1980s, a "virtual troop" composed of tanks; helicopters and other military facilities emerged for virtual military training.

- Architectural rehearsal

Architects and engineers have to build real miniature models of buildings and constructions to show what their designs would be after completion. But building models is costly and far from accurate. The client can not propose their suggestion to improve design before the real building has been built. With CAD developing, designers can use video technology to show their designs on a large screen, and the images can be amazingly realistic. But this is not enough for the client to walk into the virtual building to roam and watch here and there. VR technology provides such a possibility.

In the mid-1980s, North Carolina University decided to build a new building that cost several million USD. When the building was under primary design, VR researchers based on blue-prints of that building built a 3-dimensional virtual model, with which the client could "personally" walk into the building and watch. The client said the doors and windows were too low. Architects did not believe that until they personally entered the 3-dimensional virtual building and measured them. They made partial correction on their designs. Now such a system has been greatly improved. Simulated sounds, simulated sunlight for the day and lighting for the night, simulated fire from fireplace, etc., are added. The system can also simulate furniture and lamps made of various materials and put in different places, for the client to select.[2]

- Virtual human body

At present, researchers have accomplished models of various parts of the human body such as bone, muscle, skin and joint, and set up quite a complete database of anatomy.[3] VR researchers expect they can build more realistic virtual human body that can accept MRI, CT and other "remedy" used for scheme design before operations and for professional training. Surgeons can see the virtual human patient through the display on the helmet and can open observation window on the virtual human body to have a close look for every detail.

Virtual reality can be subdivided in many different ways. VR systems can be classified into three categories upon the visual channel.

- Head-mounted displays/BOOMs

Head-mounted displays (HMDs), which typically also include earphones for the auditory channel as well as devices for measuring the position and orientation of the user, have been the primary VR visual device for much of the 1990s. Using CRT or LCD technology, HMDs provide two imaging screens, one for each eye. Thus, given sufficient computer power, stereographic images

are generated. Typically, the user is completely immersed in the scene, although HMDs for augmented reality overlay the computer-generated image onto the view of the real world.[4]

An alternative to HMDs is the BOOM (Binocular Omni-Orientation Monitor). Two high-resolution CRTs are mounted inside a package against which the user places his eyes. By counterbalancing the CRT packaging on a free-standing platform, the display unit allows the user six-degree-of-freedom movement while placing on weight on the user's head.

HMDs and BOOMs are similar devices in that the user is fully immersed in the virtual environment and does not see his/her actual surroundings. The BOOM solves several of the limitations of the HMD (e.g., resolution, weight, field of view), but at the expense of reducing the sense of immersion by requiring the user to stand or sit in a fixed position.

- Immersive rooms

Immersion does not necessarily require the use of the head-mounted displays that are the most common method for presenting the visual channel in a virtual environment. The CAVE™ (Cave Automatic Virtual Environment), a type of immersive room facility developed at the University of Illinois, Chicago, accomplishes immersion by projecting on two or three walls and a floor and allowing the user to interactively explore a virtual environment. An immersive room is typically about 10 inch×10 inch×13 inch (height), allowing a half-dozen or more users to examine the virtual world being generated within the space.

While HMDs require that users interact in virtual spaces (they can not see each other in their "real" environment), the immersive room offers the significant advantage of permitting user interaction, discussion, and analysis in the real world. However, the computational cost of generating scenes within an immersive room is very high. Two images must be generated at high refresh rates for each wall in the immersive room. In addition, each wall requires a high-quality projector, and since back projection is used, a large allocation of space is required for projection length. Costing over one-half million dollars, immersive rooms exist only in a handful of large research organizations and corporations.

- The VR Responsive Workbench

The VR Responsive Workbench operates by projecting a computer-generated, stereoscopic image off a mirror and then onto a table surface that is viewed by a group of users around the table. Using stereoscopic shuttered glasses, users observe a 3D image displayed above the tabletop. By tracking the group leader's head and hand movements using magnetic sensors, the Workbench permits changing the view angle and interacting with the 3D scene.[5] Other group members observe the scene as manipulated by the group leader, facilitating easy communication between observers about the scene and defining future actions by the group leader. Interaction is performed using speech recognition, a pinch glove for gesture recognition, and simulated laser pointer.

The Virtual Reality Modeling Language (VRML) is a file format for describing interactive 3D objects and worlds. VRML is designed to be used on the Internet, Intranets, and local client systems. VRML is also intended to be a universal interchange format for integrated 3D graphics and multimedia. VRML may be used in a variety of application areas such as engineering and scientific visualization, multimedia presentations, entertainment and educational titles, web pages, and shared

virtual worlds.

VRML is capable of representing static and animated dynamic 3D and multimedia objects with hyperlinks to other media such as text, sounds, movies, and images. VRML browsers, as well as authoring tools for the creation of VRML files, are widely available for many different platforms. VRML supports an extensibility model that allows new dynamic 3D objects to be defined and a registration process that allows application communities to develop interoperable extensions to the base standard. There are mappings between VRML objects and commonly used 3D application programming interface (API) features.

The VRML specification defines a file format that integrates 3D graphics and multimedia. Conceptually, each VRML file is a 3D time-based space that contains graphic and aural objects that can be dynamically modified through a variety of mechanisms. VRML defines a primary set of objects and mechanisms that encourage composition, encapsulation, and extension.

Key Words

anatomy	解剖术，解剖学
armored	武装的，装甲的
augment	扩张，扩大
aural	听觉的，气氛的，预兆的
blueprint	蓝图，设计图
cannon	大炮，机关炮
combat	战斗，竞赛
conspicuous	显著的，明显的
counterbalance	使平衡，弥补，抗衡
earphone	耳机，耳塞
extensibility	扩展性，延伸性
gesture	姿势，表示
handful	一把，少数，少量
harmoniously	和谐的，相称的
helicopter	直升机
helmet	头盔，防护帽
pervade	扩大，普及
realistically	现实的，逼真的
registration	登记，记录
rehearsal	建筑演练
roam	漫游，游历
shutter	百叶窗，护窗板，快门
stereographic	立体画法的，立体摄影术的
uprising	升起，立起

Notes

[1] Medical students can be trained in a VR environment so that they would not hurt the patient and the risk of operation can be reduced to minimum.

本句由“so that”引导目的状语从句。

译文：医科学生能在 VR 环境中进行培训，这样就不会伤害病人，并能最大限度地降低手术的风险。

[2] The system can also simulate furniture and lamps made of various materials and put in different places, for the client to select.

本句的“made of various materials and put in different places”作定语，修饰宾语“furniture and lamps”，“for the client to select”作目的状语。

译文：该系统还能模拟用不同材料制成的家具和灯具并且放在不同位置供客户选择。

[3] At present, researchers have accomplished models of various parts of the human body such as bone, muscle, skin and joint, and set up quite a complete database of anatomy.

本句的主语是“researchers”，谓语是“accomplish”和“set up”，“various parts of the human body such as bone, muscle, skin and joint”作定语，修饰“models”。

译文：目前，研究人员已经完成了人体各个部分的计算机模型，如骨骼、肌肉、皮肤和关节，并且建立了相当完整的解剖学数据库。

[4] Typically, the user is completely immersed in the scene, although HMDs for augmented reality overlay the computer-generated image onto the view of the real world.

本句由“although”引导让步状语从句。

译文：一般地，虽然增加了逼真性的 HMD 把计算机生成的图像叠加在实际世界的视图上，但用户还是能够完全沉浸在此情景中。

[5] By tracking the group leader’s head and hand movements using magnetic sensors, the Workbench permits changing the view angle and interacting with the 3-D scene.

本句的“By tracking the…”作方式状语。

译文：通过使用磁传感器跟踪小组长头与手的移动，工作台允许改变视角并且与三维景象进行交互。

6.2.2 Exercises

1．Translate the following phrases into English

（1）视频技术

（2）头戴式显示器

（3）初始设计

（4）三维虚拟模型

（5）高分辨率

（6）虚拟人体

（7）虚拟空间

（8）虚拟响应工作台

2．Translate the following phrases into Chinese

（1）virtual reality

（2）architectural rehearsal

（3）virtual training device

（4）application programming interface

（5）virtual military training

（6）artificial virtual environment

（7）professional training

（8）back projection

3．Identify the following to be True or False according to the text

（1）In the mid-1980s, North Carolina University decided to build a new building that cost several million USD.

（2）In the early 1970s, the Pentagon supervised a virtual battlefield for training tank formations.

（3）The computational cost of generating scenes within an immersive room is not very high.

（4）The newly uprising VR technology has given rise to innovation in all domains.

（5）VRML is capable of representing static and animated dynamic 3D and multimedia objects with hyperlinks to other media.

（6）The VRML specification defines a file format that can not integrate 3D graphics and multimedia.

（7）Building models is costly and far from accurate.

（8）Immersion does necessarily require the use of the head-mounted displays.

4．Reading Comprehension

（1）An immersive room is typically about_____, allowing a half-dozen or more users to examine the virtual world being generated within the space.

a．10 inch×12 inch×13 inch (height)

b．10 inch×10 inch×10 inch (height)

c．10 inch×13 inch×10 inch (height)

d．10 inch×10 inch×13 inch (height)

（2）Virtual reality is a new technology, which emerged after the_____.

a．1960s

b．1970s

c．1980s

d．1990s

（3）The VRML is a file format for describing interactive_____.

a．multimedia

b．3D objects and worlds

c．objects

d．virtual worlds

（4）HMDs and_____are similar devices in that the user is fully immersed in the virtual environment and does not see his/her actual surroundings.

a. BOOMs
b. Immersive rooms
c. VR Responsive Workbench
d. VRML

6.2.3 Reading Material

Ubiquitous Computing and Distributed Computing

Ubiquitous computing

Ubiquitous computing names the third wave in computing, just now beginning. First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives. Alan Kay of Apple calls this “Third Paradigm” computing.

Ubiquitous computing is roughly the opposite of virtual reality. Where virtual reality puts people inside a computer-generated world, ubiquitous computing forces the computer to live out here in the world with people. Virtual reality is primarily a horse power problem; ubiquitous computing is a very difficult integration of human factors, computer science, engineering, and social sciences.

Ubiquitous computing gives us tools to manage information easily. Information is the new currency of the global economy. We increasingly rely on the electronic creation, storage, and transmittal of personal, financial, and other confidential information, and demand the highest security for all these transactions. We require complete access to time-sensitive data, regardless of physical location. We expect devices—personal digital assistants, mobile phones, office PCs and home entertainment systems—to access that information and work together in one seamless, integrated system. Ubiquitous computing can help us manage information quickly, efficiently, and effortlessly.

Ubiquitous computing is about making our lives simpler. Ubiquitous computing aims to enable people to accomplish an increasing number of personal and professional transactions using a new class of intelligent and portable devices. It gives people convenient access to relevant information stored on powerful networks, allowing them to easily take action anywhere, anytime.

These new intelligent applications or “smart devices” are embedded into microprocessors that allow users to plug into intelligent networks and gain direct, simple, and secure access to both relevant information and services. These devices are as simple to use as calculators, telephones or kitchen toasters.

Ubiquitous computing simplifies life by combining open standards-based applications with everyday activities. It removes the complexity of new technologies, enables us to be more efficient in our work and leaves us more leisure time. Computing is no longer a discrete activity bound to a desktop; ubiquitous computing is fast becoming a part of everyday life.

IBM is at the vanguard of ubiquitous computing. It spearheads communities and initiatives for open standards that will enable continued growth and development of ubiquitous computing technology. IBM leverages its knowledge of business processes and ability to analyze enterprise data into an unrivaled perspective on business problems and solutions across the global economy. And their leadership in security solutions for networked environments matches their commitment to a world that is both interconnected and secure.

Distributed computing

The Distributed Computing Environment (DCE) Threads Service provides portable facilities that allow a programmer to build an application that performs many actions simultaneously. Threads Service includes operations to create and control multiple threads of execution within a single process and synchronize across to global data within an application. This threading capability becomes particularly important within the context of a Remote Procedure Calls (RPC), for instance. RPC, by nature, is synchronous operations. A client makes a call for a remote function and then waits until the request is fulfilled. With threads, however, one thread can make the request while another begins to process data from a different request. Threading can greatly improve the performance of a distributed application.

Threads Service puts less demand on the skill of a programmer than on other alternatives such as explicit asynchronous operations and shared memory. Asynchronous interfaces, although they have existed in some environments for some time, can be a major cost drain, the less retraining a new technology requires, the better.

RPC are one of the tried-and-true models of implementing distributed processing. Their function is to make procedures in an application run on a computer any where in the network. The benefit of such an RPC approach is that it provides simplicity to the programmer. RPC adhere to the local procedure model as closely as possible while providing the distributed aspects of applications in a straightforward manner. In other words, it foists less of a conceptual change on developers, thus reducing retraining time. This is especially important for in-house corporate development teams. Regardless of the transport protocol used, RPC provide identical behavior within applications and keep the management of connections invisible. This means developers do not have to rewrite applications to support different transport services. The RPC interface supports a variety of transports simultaneously and allows the introduction of new transports and protocols without affecting the coding of the application.

6.3 Neural Network

6.3.1 Text

An Artificial Neural Network (ANN) is a mathematical or computational model for information processing based on a connectionist approach to computation. There is no precise agreed definition amongst researchers as to what a neural network is, but most would agree that it involves a network of relatively simple processing elements, where the global behavior is determined by the connections

between the processing elements and element parameters. The original inspiration for the technique was from examination of bioelectrical networks in the brain formed by neurons and their synapses.[1] In a neural network model, simple nodes (or “neurons”, or “units”) are connected together to form a network of nodes—hence the term “neural network”. A neural network is an interconnected group of nodes, akin to the vast network of neurons in the human brain.

Structure and Applications of Neural Networks

Like the brain, an ANN is a massively parallel collection of small and simple processing units where the interconnections form a large part of the network’s intelligence. Artificial neural networks, however, are quite different from the brain in terms of structure. For example, a neural network is much smaller than the brain. Also, the units used in a neural network are typically far simpler than neurons. Nevertheless, certain functions that seem exclusive to the brain, such as learning, have been replicated on a simpler scale with neural networks.

A typical feed-forward neural network is a set of nodes. Some of these are designated input nodes, some output nodes, and in-between are hidden nodes. Each connection between neurons has a numerical weight. When the network is in operation, a value will be applied to each input node—the values being fed in by a human operator, from environmental sensors, or from some external program. Each node then passes its given value to the connections leading out from it, and on each connection the value is multiplied by the weight associated with that connection.[2] Each node in the next layer then receives a value which is the sum of the values produced by the connections leading into it, and in each node a simple computation is performed on the value—a sigmoid function is typical. This process is then repeated, with the results being passed through subsequent layers of nodes until the output nodes are reached.

Typically the weights in a neural network are initially set to small random values. This represents the network knowing nothing; its output is essentially a random function of its input. As the training process proceeds, the connection weights are gradually modified according to computational rules specific to the learning algorithm being used. Ideally the weights eventually converge to values allowing them to perform a useful computation.

Neural networks are particularly useful for dealing with bounded real-valued data, where a real-valued output is desired; in this way neural networks will perform classification by degrees, and are capable of expressing values equivalent to “not sure”.

In real life applications, neural networks perform particularly well on the following common tasks:

- Function approximation.
- Time series prediction.
- Classification.
- Pattern recognition.

Other kinds of neural networks, in particular continuous-time recurrent neural networks, are used in conjunction with genetic algorithms to produce robot controllers.[3] The genome is then constituted of the networks parameters and the fitness of a network is the adequacy of the behavior

exhibited by the controlled robot.

ANN has several advantages, because it resembles the principles of the neural system structure.[4]

- Learning: ANN has the ability to learn based on the so called learning stage.
- Auto organization: an ANN creates its own representation of the data given in the learning process.
- Tolerance to faults: because ANN stores redundant information, partial destruction of the neural network does not damage completely the network response.
- Flexibility: ANN can handle input data without important changes like noisy signals or others changes in the given input data.
- Real time: ANN is a parallel structure, if it is performed in this way using computers or special hardware real time can be achieved.

Types of Neural Networks

- Single-layer perceptron

The earliest kind of neural network is a single-layer perceptron network, which consists of a single layer of output nodes; the inputs are fed directly to the outputs via a series of weights. In this way it can be considered the simplest kind of feed-forward network.

- Multi-layer perceptron

This class of networks consists of multiple layers of computational units, usually interconnected in a feed-forward way. Each neuron in one layer has directed connections to the neurons of the subsequent layers. In many applications the units of these networks apply a sigmoid function as an activation function.

Multi-layer networks use a variety of learning techniques, the most popular being back-propagation. Here the output values are compared with the correct answer to compute the value of some predefined error-function. By various techniques the error is then fed back through the network. Using this information, the algorithm adjusts the weights of each connection in order to reduce the value of the error function by some small amount. After repeating this process for a sufficiently large number of training cycles the network will usually converge to some state where the error of the calculations is small. In this case one says that the network has learned a certain target function.

- Recurrent network

Recurrent networks are models with bi-directional data flow. While a feed-forward network propagates data linearly from input to output, recurrent networks also propagate data from later processing stages to earlier stages.

- Hopfield network

The Hopfield network is a recurrent neural network in which all connections are symmetric. Invented by John Hopfield in 1982, this network guarantees that its dynamics will converge. If the connections are trained using Hebbian learning then the Hopfield network can perform robust content-addressable memory, robust to connection alteration.

- Committee of machines

A committee of machines is a collection of different neural networks that together “vote” on a given example. This generally gives a much better result compared to other neural network models. In fact in many cases, starting with the same architecture and training but different initial random weights gives vastly different networks.[5] A committee of machines tends to stabilize the result. The committee of machine is similar to the general machine learning bagging method, except that the necessary variety of machines in the committee is obtained by training from different random starting weights rather than training on different randomly selected subsets of the training data.

- Instantaneously trained networks

Instantaneously trained neural networks are also called “Kak networks” after their inventor Subhash Kak. They were inspired by the phenomenon of short-term learning that seems to occur instantaneously. In these networks the weights of the hidden and the output layers are mapped directly from the training vector data. Ordinarily, they work on binary data but versions for continuous data that require small additional processing are also available.

Key Words

adequacy	适当，恰当
akin	同族的，同种的
approximation	接近，近似
destruction	破坏，毁灭
exclusive	除外的，排外的
genetic	遗传的
genome	基因组，染色体组
inspiration	激励，鼓舞
linearly	线性地
neuron	神经元，神经细胞
propagation	传播，普及
prediction	预言，预告
recurrent	回归的，循环的
replicate	重复，复制
robust	强壮的，强健的
stabilize	使稳定，使安定
synapses	突触，（神经元的）触处
tolerance	容忍，忍受
vote	投票，表决

Notes

[1] The original inspiration for the technique was from examination of bioelectrical networks in the brain formed by neurons and their synapses.

本句中的“formed by neurons and their synapses”作定语，修饰“bioelectrical networks in the

brain”，而这两部分组合起来作为定语修饰“examination”。

译文：这项技术的最初灵感来自于对由神经元和神经突触构成的大脑的生物电网络的研究。

[2] Each node then passes its given value to the connections leading out from it, and on each connection the value is multiplied by the weight associated with that connection.

这是并列句子结构，“to the connections leading out from it”是宾语补足语；“on each connection”作地点状语，“associated with that connection”作定语，修饰宾语“weight”。

译文：然后每个节点把给定的值传给从它开始的连接点，在每个连接点上这个值乘以与该节点相关联的权值。

[3] Other kinds of neural networks, in particular continuous-time recurrent neural networks, are used in conjunction with genetic algorithms to produce robot controllers.

“in particular continuous-time recurrent neural networks”是“Other kinds of neural networks”的同位语，“to produce robot controllers”作目的状语。

译文：其他类型的神经网络，特别是连续回归神经网络，与遗传算法一起使用产生了机器人控制器。

[4] ANN has several advantages, because it resembles the principles of the neural system structure.

本句由“because”引导原因状语从句。

译文：由于类似神经系统结构的原理，ANN 有许多优势。

[5] In fact in many cases, starting with the same architecture and training but different initial random weights gives vastly different networks.

“In fact in many cases”是条件状语，本句的主语是分词短语结构，谓语是“gives”。

译文：事实上，在很多例子中，以相同的体系和训练方法开始，但初始的随机权值不同，会产生极不相同的网络。

6.3.2 Exercises

1．Translate the following phrases into English

（1）随机函数

（2）环境传感器

（3）前馈神经网络

（4）回归网络

（5）人工神经网络

（6）多层网络

（7）输出节点

（8）冗余信息

2．Translate the following phrases into Chinese

（1）computational unit

（2）noisy signal

（3）target function

（4）processing unit

（5）subsequent layer

（6）human brain

（7）auto organization

（8）genetic algorithm

3．Identify the following to be True or False according to the text

（1）Neural networks are particularly useful for dealing with bounded real-valued data.

（2）ANN has not the ability to learn based on the so called learning stage.

（3）A neural network is much bigger than the brain.

（4）A committee of machines is a collection of different neural networks that together “vote” on a given example.

（5）There is no precise agreed definition amongst researchers as to what a neural network is.

（6）The recurrent network is similar to the general machine learning bagging method.

（7）Feedback networks are models with bi-directional data flow.

（8）Typically the weights in a neural network are initially set to big random values.

4．Reading Comprehension

（1）A neural network is an interconnected group of nodes, akin to the vast network of neurons in the_____

a．robot

b．human brain.

c．human body

d．brain

（2）Instantaneously trained neural networks are also called _____after their inventor Subhash Kak.

a．“Kak networks”

b．“Subhash networks”

c．“Subhash Kak networks”

d．“SK networks”

（3）An ANN is a mathematical or_____ model for information processing based on a connectionist approach to computation.

a．physical

b．non-mathematical

c．computational

d．economical

（4）The earliest kind of neural network is a _____perceptron network, which consists of a single layer of output nodes.

a．two-layer

b．multi-layer

c．single-layer

d．recurrent

6.3.3 Reading Material

Desktop Conferencing and Expert System

Desktop conferencing

Video-conferencing is gradually becoming an accepted means in which to do business. For a long time it suffered from the image of the video-conferencing suite, cumbersome and expensive to operate with long booking lead times. It's tended to be confined to special executive meetings on different continents and its practicality for everyday uses tended to be overlooked. That was perfectly understandable given the state of the technology. But desktop video-conferencing entered the market with an explosion of publicity several years ago and have been growing at a steady rate since.

Changes in the way we work are going to provide one of the most important spurs to the growth in the use of this technology. Mobile working is making traditional communications methods obsolete and rapid information exchange a priority. Video-conferencing is well positioned to help companies who have a heavy reliance on immediate employee communications to meet this need in the ever changing working environment.

For those who are new to videoconferencing it is worth defining the key areas of video-conferencing to help in understanding the market. Video-conferencing enables audio and video transmission between separate locations from anywhere in the world. Video-conferences can be point-to-point exactly like a telephone call, or multipoint enabling "virtual" meeting amongst three or more locations to take place, both most commonly using an ISDN network.

Multipoint conferences require a physical device called a Multipoint Control Unit (MCU) or "bridge". The MCU's function is to recognize that each participant is using an industry standard and then connect all the participants together. The technical complexities of operating a bridge requires a telecoms department within an organization, however most choose to avoid the costs and work associated with this and use a multipoint service provider which is where AT&T's expertise lies.

Intel who produce the Proshare desktop conferencing software are actively targeting the business markets and trying to drive down the cost of video-conferencing. They believe video-conferencing will be "the norm" in the future and as common as any other software currently residing on your PC.

The main advantage of the desktop product is the data sharing capability which allows a user to launch a software application and share it with other users. The power of this is clear to see. Document can be agreed and amended with desktop users throughout the world in real-time, instead of faxing documents backwards and forwards with comments or trying to make change over the phone which often leads to mistakes being made. In a multipoint environment application sharing operates using the T.120 industry standard.

Your PC is always available to you on your desk and all you need to do to set up a meeting with three or more people is to reserve a call with a multipoint service provider such as AT&T and dial into a bridge. You can then be linked with up to 24 different worldwide locations. Not only will you

save time and money, you will also develop more effective face to face working relationships with your colleagues, customers or suppliers.

Expert system

An expert system is a set of programs that manipulate encoded knowledge to solve problems in a specialized domain that normally requires human expertise. An expert system's knowledge is obtained from expert sources and coded in a form suitable for the system to use in its inference or reasoning processes. The expert knowledge must be obtained from specialists or other sources of expertise, such as texts, journal articles, and data bases. This type of knowledge usually requires much training and experience in some specialized field such as medicine, geology, system configuration, or engineering design. Once a sufficient body of expert knowledge has been acquired, it must be encoded in some form, loaded into a knowledge base, then tested, and refined continually throughout the life of the system.

Expert systems differ from conventional computer systems in several important ways.

1. Expert systems use knowledge rather than data to control the solution process. Much of the knowledge used is heuristic in nature rather than algorithmic.

2. The knowledge is encoded and maintained as an entity separate from the control program. As such, it is not compiled together with the control program itself. This permits the incremental addition and modification of the knowledge base without recompilation of the control programs.

3. Expert systems are capable of explaining how a particular conclusion was reached, and why requested information is needed during a consultation.

4. Expert systems use symbolic representations for knowledge (rules, networks, or frames) and perform their inference through symbolic computations that closely resemble manipulations of natural language.

5. Expert systems often reason with meta-knowledge; that is, they reason with knowledge about themselves, and their own knowledge limits and capabilities.

练 习 答 案

Unit 1　Hardware Basics

1.1　Central Processing Unit

1．Translate the following phrases into English

（1）集成电路　integrated circuit
（2）取指—译码—执行　fetch-decode-execute
（3）算术逻辑运算　Arithmetic Logical Operations
（4）微电子技术　microelectronic techniques
（5）数字计算机系统　digital computer system
（6）辅助存储器　auxiliary storage
（7）工作区　workspace
（8）逻辑决策　logic decision

2．Translate the following phrases into Chinese

（1）Central Processing Unit　中央处理器
（2）functional unit　功能单元
（3）current instruction　当前指令
（4）instruction register　指令寄存器
（5）program counter　程序计数器
（6）electronic components　电子元件
（7）input information and commands　输入信息和指令
（8）Arithmetic/Logic Unit　算术逻辑单元

3．Identify the following to be True or False according to the text

F　T　T　F　T　F　F　T

4．Reading Comprehension

（1）c．a control unit and an arithmetic/logic unit
（2）d．instructions
（3）a．A register
（4）b．fetch-decode-execute

1.2　Memory

1．Translate the following phrases into English

（1）易失性存储器　volatile memory
（2）外围电路　peripheral circuit

（3）实模式　　the real mode
（4）寻址能力　　address ability
（5）闪存　　flash memory
（6）刷新电路　　refresh circuitry
（7）只读存储器　　Read Only Memory
（8）随机存取存储器　　Random Access Memory

2．Translate the following phrases into Chinese

（1）periodic refresh　　定期刷新
（2）software interrupt　　软件中断
（3）binary number　　二进制数字
（4）electrically erasable PROM　　电可擦除可编程的只读存储器
（5）expanded memory　　扩展存储器
（6）erasable programmable ROM　　可擦除可编程的只读存储器
（7）refresh cycle　　刷新周期
（8）logical page　　逻辑页面

3．Identify the following to be True or False according to the text

T　F　T　T　F　F　T　T

4．Reading Comprehension

（1）a．1 000 000 bytes
（2）c．2^n different bit combinations
（3）b．lost
（4）c．DRAM

1.3　Input/Output Systems

1．Translate the following phrases into English

（1）通信瓶颈　　communication bottleneck
（2）总线协议　　bus protocol
（3）像素距离　　element distance
（4）只读光盘　　read only optical disk
（5）电子枪　　electron gun
（6）输出设备　　output device
（7）水平方向　　horizontal direction
（8）总线带宽　　bus bandwidth

2．Translate the following phrases into Chinese

（1）numeric keypad　　数字键盘
（2）electron-beam　　电子束
（3）typematic effect　　自动复击效应
（4）scan style　　扫描类型
（5）data transfer rate　　数据传输速率
（6）source and the destination　　源和目的

（7）magnetic polarity　　磁性
（8）disk sector　　磁盘扇区

3．Identify the following to be True or False according to the text

T　T　F　F　T　T　F　T

4．Reading Comprehension

（1）d．The keyboard has not arrow keys.
（2）a．Element Distance
（3）b．control bus
（4）c．tens MHz to hundreds MHz

Unit 2　Software Knowledge

2.1　C Language

1．Translate the following phrases into English

（1）高级语言　　high-level language
（2）源代码　　source code
（3）动态变量　　dynamic variable
（4）顶层　　top-level
（5）全局变量　　global variable
（6）一对多　　one-to-many
（7）数学公式　　mathematical equation
（8）库函数　　library function

2．Translate the following phrases into Chinese

（1）structured programming language　　结构化编程语言
（2）machine language　　机器语言
（3）local variable　　局部变量
（4）external variable　　外部变量
（5）a called function　　被调用函数
（6）a calling function　　调用函数
（7）run-time system　　实时系统
（8）assembly language　　汇编语言

3．Identify the following to be True or False according to the text

F　T　T　F　F　T　T　T

4．Reading Comprehension

（1）d．Fixed variables
（2）a．source code
（3）a．1970s
（4）d．calling function

2.2 Data Structure

1．Translate the following phrases into English

（1）内部结构 internal construction
（2）数据类型 data type
（3）输入/输出请求 input/output request
（4）结构数据类型 structured data type
（5）数据值 data value
（6）算术表达式 arithmetic expression
（7）先来先服务 first-come/first-served
（8）函数调用 function call

2．Translate the following phrases into Chinese

（1）last-in/first-out 后进先出
（2）atomic data type 原子数据类型
（3）stack space 堆栈空间
（4）data structure 数据结构
（5）return address 返回地址
（6）fatal error 致命的错误
（7）run out 用完
（8）stack information 堆栈信息

3．Identify the following to be True or False according to the text

T F F T F T T T

4．Reading Comprehension

（1）c．either component values or component elements
（2）a．an atomic data type
（3）d．first-in/first-out
（4）b．first-in/last-out

2.3 Operating System

1．Translate the following phrases into English

（1）文件存储空间 file storage space
（2）任务切换 context switching
（3）多用户系统 multi-user system
（4）操作系统 operating system
（5）资源管理器 resource manager
（6）多任务 multi-task
（7）单任务 single-task
（8）作业队列 job queue

2．Translate the following phrases into Chinese

（1）efficient operation 有效操作
（2）controlling the I/O devices 控制输入/输出设备

（3）allocate resource　　分配资源
（4）key functions　　关键功能
（5）input/output control system　　输入/输出控制系统
（6）system module　　系统模块
（7）concentrate on　　集中
（8）control instruction　　控制指令

3．Identify the following to be True or False according to the text

T　T　F　T　F　T　F　T

4．Reading Comprehension

（1）c．operating system
（2）c．job queue
（3）b．control instructions
（4）b．convenience

2.4　Principles of Compiler

1．Translate the following phrases into English

（1）语法规则　　grammar rule
（2）代码生成器　　code generator
（3）运行时错误　　run time error
（4）上下文无关语法　　context-free grammar
（5）词法分析器　　lexical analyzer
（6）目标机器　　object machine
（7）中间代码　　intermediate code
（8）源程序　　source program

2．Translate the following phrases into Chinese

（1）syntactic analyzer　　语法分析器
（2）code optimization　　代码优化
（3）syntactic error　　语法错误
（4）internal format　　内部格式
（5）stream of characters　　字符流
（6）semantic processor　　语义处理器
（7）programming language　　编程语言
（8）mathematical notation　　数学符号表示法

3．Identify the following to be True or False according to the text

T　T　F　T　F　F　T　T

4．Reading Comprehension

（1）d．operating system
（2）a．scanner
（3）b．the report of an error
（4）d．grammar rules

2.5 Database Technologies

1．Translate the following phrases into English

（1）物理存储组织　　physical storage organization
（2）数据库管理系统　　database management system
（3）事务管理　　transaction-management
（4）数据定义语言　　data definition language
（5）数据字典　　data dictionary
（6）数据库管理员　　database administrator
（7）完整性约束　　integrity constraint
（8）物理细节　　physical details

2．Translate the following phrases into Chinese

（1）database system　　数据库系统
（2）take place　　发生
（3）database schema　　数据库模式
（4）single logical function　　单一逻辑功能
（5）database-consistency constraints　　数据库一致性约束
（6）detect system failures　　检测系统故障
（7）storage manager　　存储管理器
（8）schema definition　　模式定义

3．Identify the following to be True or False according to the text

F　F　T　T　F　T　T　T

4．Reading Comprehension

（1）d．DDL
（2）b．file system
（3）a．transaction
（4）c．A database system

Unit 3　Multimedia and Its Applications

3.1 Multimedia

1．Translate the following phrases into English

（1）同步声音　　synchronized sound
（2）数据压缩　　data compression
（3）字处理程序　　word processing program
（4）多媒体演示系统　　multimedia presentation system
（5）文字的信息　　textual information
（6）多媒体服务　　multimedia service
（7）弹出式窗口　　pop-up windows
（8）国际标准　　international standard

2．Translate the following phrases into Chinese

（1）digital image　　数字图像
（2）media element　　媒体元素
（3）playback rate　　回放速度
（4）full-motion video　　全运动视频
（5）multimedia application　　多媒体应用程序
（6）Desktop Conferencing System　　桌面会议系统
（7）Musical Instrument Digital Interface　　乐器数字接口
（8）hard disk space　　硬磁盘空间

3．Identify the following to be True or False according to the text

F　F　F　T　T　T　T　F

4．Reading Comprehension

（1）c．Text
（2）d．formats
（3）a．multimedia application
（4）b．understandable

3.2　Computer Graphics and Images

1．Translate the following phrases into English

（1）数学函数　　mathematical function
（2）几何结构　　geometric structure
（3）饼图　　pie chart
（4）帧缓冲器　　frame buffer
（5）视频显示器　　visual display unit
（6）电子束　　electron beam
（7）数字图像　　digital image
（8）像素比　　pixel ratio

2．Translate the following phrases into Chinese

（1）integer value　　整数值
（2）straight line　　直线
（3）industrial automation　　工业自动化
（4）curved line　　曲线
（5）three-dimensional graph　　三维图形
（6）low-level procedure　　低层过程
（7）output primitive　　输出图元
（8）closed-circuit television　　闭路电视

3．Identify the following to be True or False according to the text

T　T　T　T　F　F　F　F

4．Reading Comprehension

（1）d．Radar and sonar

（2）c．straight-line
（3）b．output device
（4）a．polygon

3.3 Computer Aided Design

1．Translate the following phrases into English
（1）绘图板 drawing board
（2）计算机数字控制的 computer numerical controlled
（3）复杂计算 complicated calculation
（4）光笔 light pen
（5）现实世界行为 real-world behavior
（6）阴极射线管 cathode-ray tube
（7）人机界面 man-machine interface
（8）工程制图 engineering drawing
2．Translate the following phrases into Chinese
（1）digital form 数字形式
（2）manufacturing process 制造过程
（3）time constraint 时间限制
（4）test results 测试结果
（5）conventional modeling technique 传统的模型技术
（6）manufacturing instruction 制造指令
（7）building design 建筑设计
（8）electronic circuit design 电路设计
3．Identify the following to be True or False according to the text
F F T F T F T T
4．Reading Comprehension
（1）a．Computer Aided Design
（2）b．In the past
（3）c．computer
（4）d．designer

3.4 Computer Animation

1．Translate the following phrases into English
（1）数字模型 numerical model
（2）工作区 work area
（3）时间间隔 time interval
（4）实时回放 real-time playback
（5）伪彩色 pseudo-color
（6）效果控制 effective control
（7）关键帧 key-frame

（8）时间轴标尺　　time ruler

2．Translate the following phrases into Chinese

（1）layer control area　　层控制区域

（2）in-between frame　　插值帧

（3）aircraft pilot　　飞机驾驶员

（4）time-axis window　　时间轴窗口

（5）animation sequence　　动画序列

（6）physical process　　物理过程

（7）tool button　　工具按钮

（8）backstage and stage　　幕后和舞台

3．Identify the following to be True or False according to the text

F　F　T　T　F　T　F　T

4．Reading Comprehension

（1）d．1440

（2）c．24 frames

（3）b．time-axis

（4）d．layers

3.5　Multimedia Software

1．Translate the following phrases into English

（1）模型库　　module library

（2）对话框　　dialogue box

（3）矢量图形　　vector-based graphics

（4）圆角矩形　　rounded rectangle

（5）大纲视图　　Outline view

（6）可视化编辑环境　　visual editing environment

（7）幻灯片放映　　slide projection

（8）代码视图　　Code view

2．Translate the following phrases into Chinese

（1）sound effect　　声音效果

（2）overlook view　　预览视图

（3）design view　　设计视图

（4）single click　　单击

（5）text document　　文本文档

（6）projection order　　放映顺序

（7）multimedia display software　　多媒体演示软件

（8）action button　　动作按钮

3．Identify the following to be True or False according to the text

F　T　T　F　F　T　T　F

4．Reading Comprehension

（1）a．one

（2）b．Photoshop

（3）d．code

（4）a．slide projection

Unit 4　Network Knowledge

4.1　Computer Networks

1．Translate the following phrases into English

（1）硬件资源共享　　hardware resource sharing

（2）局域网　　Local Area Network

（3）广域网　　Wide Area Network

（4）物理布局　　physical layout

（5）微波　　macro-wave

（6）环网　　ring network

（7）点对点　　point to point

（8）网络配置　　network configuration

2．Translate the following phrases into Chinese

（1）star network　　星型网络

（2）video equipment　　视频设备

（3）telephone line　　电话线

（4）high-level network protocol　　高层网络协议

（5）multi-drop　　多分支的

（6）common carriers　　电信公司

（7）common carriers　　公共负载

（8）bus network　　总线网络

3．Identify the following to be True or False according to the text

F　T　T　F　F　T　T　T

4．Reading Comprehension

（1）a．bus network

（2）b．star network

（3）c．cable

（4）d．hardware

4.2　How Internet Search Engines Work

1．Translate the following phrases into English

（1）万维网　　World Wide Web

（2）集成数据　　gathered data

（3）学术搜索引擎　　academic search engine

（4）压缩形式　　compact form
（5）网页　　Web page
（6）自然语言查询　　natural language query
（7）网站　　Web site
（8）统计分析　　statistical analysis

2．Translate the following phrases into Chinese

（1）Internet search engine　　互联网搜索引擎
（2）serious value　　重要的值
（3）Domain Name Server　　域名
（4）software robot　　软件机器人
（5）font size　　字体大小
（6）concept-based searching　　基于概念的搜索
（7）Web crawling　　网络爬虫
（8）key component　　关键因素

3．Identify the following to be True or False according to the text

T　T　F　T　F　T　T　F

4．Reading Comprehension

（1）c．the word and URL
（2）d．Web pages
（3）a．spiders
（4）a．words

4.3　Wireless Network

1．Translate the following phrases into English

（1）周期前缀　　cyclic prefix
（2）分布式系统　　Distribution System
（3）无线天线　　wireless antenna
（4）无线局域网　　wireless local area networking
（5）移动电话　　mobile phone
（6）延迟扩展系统　　delay-spread system
（7）手持设备　　handheld device
（8）基站　　base station

2．Translate the following phrases into Chinese

（1）Infrared technology　　红外技术
（2）radio communication　　无线电传输
（3）streaming video　　流视频
（4）symbol transmission　　符号传输
（5）Access Point　　接入点
（6）Coded Orthogonal Frequency Division Multiplexing　　正交频分多址
（7）line-of-sight transmission　　瞄准传输

（8）portable device　　便携式设备

3．Identify the following to be True or False according to the text

F　T　F　F　F　T　T　T

4．Reading Comprehension

（1）d．external networks

（2）b．wireless communication.

（3）d．802.11 cards

（4）a．54M bit/sec

4.4 Internet Security

1．Translate the following phrases into English

（1）公开密钥　　public key

（2）非授权通信　　unauthorized communication

（3）防火墙设备　　firewall device

（4）传统通信　　traditional communication

（5）非对称密钥　　asymmetric key encryption

（6）证书授权机构　　Certificate Authority

（7）私有密钥　　private key

（8）数字认证　　digital certificate

2．Translate the following phrases into Chinese

（1）up-to-date　　最近的，当代的

（2）distrusted network　　不可靠网络

（3）symmetric key encryption　　对称密钥

（4）security level　　安全级别

（5）fear about　　害怕…

（6）legal documents　　合法文档

（7）unauthorized access　　非授权访问

（8）security device　　安全设备

3．Identify the following to be True or False according to the text

F　T　F　F　T　T　T　T

4．Reading Comprehension

（1）c．cybermarket

（2）a．asymmetric key encryption

（3）d．1.5 million

（4）b．security system

Unit 5　Electronic-commerce Knowledge

5.1　Electronic-Commerce

1．Translate the following phrases into English

（1）电子商务	electronic-commerce
（2）信用卡	credit card
（3）传统市场	traditional market
（4）电子媒介	electronic media
（5）公共政策	public policy
（6）不可抵赖	non-repudiation
（7）在线服务	online service
（8）隐私声明	privacy statements

2．Translate the following phrases into Chinese

（1）intellectual property	知识产权
（2）commercial electronic application	商务电子应用
（3）legal loopholes	法律漏洞
（4）buying and selling products	买卖产品
（5）international business	国际商务
（6）competitive advantage	竞争优势
（7）traditional merchant	传统商家
（8）consumer protection	消费者保护

3．Identify the following to be True or False according to the text

T　T　F　F　T　F　F　T

4．Reading Comprehension

（1）b．C2B

（2）d．traditional merchants

（3）c．From an online perspective

（4）d．confidential

5.2　Electronic Data Interchange

1．Translate the following phrases into English

（1）电子数据交换	Electronic Data Interchange
（2）订单处理系统	order processing system
（3）增值网	value-added network
（4）交易伙伴	trading partner
（5）硬件无关的	hardware independent
（6）结构化数据	structured data
（7）映射软件	mapping software
（8）波特率	baud rate

2．Translate the following phrases into Chinese

（1）health care industry　　健康保险业
（2）Phone Company　　电话公司
（3）stock holding　　库存
（4）human resources　　人力资源
（5）trade cycle　　交易周期
（6）paper order　　纸质订单
（7）translation software　　翻译软件
（8）postal service　　邮政服务

3．Identify the following to be True or False according to the text

T　F　T　T　F　F　F　T

4．Reading Comprehension

（1）a．EDI community.
（2）c．Mapping software
（3）b．network
（4）a．standard.

5.3　Advertising Methods on the Web

1．Translate the following phrases into English

（1）随机旗帜广告　　random banner
（2）网络广告　　Web advertisement
（3）弹出窗口　　splash screen
（4）双向通信　　two-way communication
（5）聊天室　　chat rooms
（6）图形信息　　graphical message
（7）场地租赁　　spot leasing
（8）主页　　home page

2．Translate the following phrases into Chinese

（1）video clips　　视频片断
（2）target audience　　目标观众
（3）keyword banner　　关键字旗帜广告
（4）user’s attention　　用户的注意力
（5）information superhighway　　信息高速公路
（6）Universal Resource Locators　　统一资源定位器
（7）interactive marketing　　交互市场
（8）e-mail address　　电子邮件地址

3．Identify the following to be True or False according to the text

T　T　F　T　F　F　F　F

4．Reading Comprehension

（1）d．software chat vendors

（2）b．a consumer
（3）b．a splash page
（4）c．Search engines

Unit 6　New Technologies

6.1　Artificial Intelligence

1．Translate the following phrases into English

（1）人类智能	human intellect
（2）机器翻译	machine translation
（3）办公自动化系统	office automatic system
（4）人工智能	artificial intelligence
（5）专家系统	expert system
（6）控制系统	control system
（7）抽象概念	abstract concept
（8）模式识别	pattern recognition

2．Translate the following phrases into Chinese

（1）stock market analysis	股票市场分析
（2）classical computational system	经典计算系统
（3）knowledge base	知识库
（4）symbolic manipulation	符号处理
（5）intelligent simulation	智能模拟
（6）linguistic intelligence	语言智能
（7）intelligent control	智能控制
（8）speech recognition	语音识别

3．Identify the following to be True or False according to the text

F　F　T　T　F　T　T　F

4．Reading Comprehension

（1）b．a human mind
（2）c．computer programs
（3）d．fifth generation
（4）d．Strong artificial intelligence

6.2　Virtual Reality

1．Translate the following phrases into English

（1）视频技术	video technology
（2）头戴式显示器	head-mounted display
（3）初始设计	primary design
（4）三维虚拟模型	3-dimensional virtual model

（5）高分辨率　　high-resolution
（6）虚拟人体　　virtual human body
（7）虚拟空间　　virtual space
（8）虚拟响应工作台　　VR Responsive Workbench

2．Translate the following phrases into Chinese

（1）virtual reality　　虚拟现实
（2）architectural rehearsal　　建筑演练
（3）virtual training device　　虚拟训练设备
（4）application programming interface　　应用程序接口
（5）virtual military training　　虚拟军事训练
（6）artificial virtual environment　　人工虚拟环境
（7）professional training　　专业训练
（8）back projection　　背投

3．Identify the following to be True or False according to the text

T　F　F　T　T　F　T　F

4．Reading Comprehension

（1）b．10 inch×10 inch×10 inch (height)
（2）c．1980s
（3）b．3D objects and worlds
（4）a．BOOMs

6.3　Neural Network

1．Translate the following phrases into English

（1）随机函数　　random function
（2）环境传感器　　environmental sensor
（3）前馈神经网络　　feed-forward neural network
（4）回归网络　　recurrent network
（5）人工神经网络　　Artificial Neural Network
（6）多层网络　　multi-layer network
（7）输出节点　　output node
（8）冗余信息　　redundant information

2．Translate the following phrases into Chinese

（1）computational unit　　计算单元
（2）noisy signal　　噪声信号
（3）target function　　目标函数
（4）processing unit　　处理单元
（5）subsequent layer　　后继层
（6）human brain　　人类大脑
（7）auto organization　　自组织
（8）genetic algorithm　　遗传算法

3. Identify the following to be True or False according to the text

T F F T T F F F

4. Reading Comprehension

（1）b. human brain.

（2）a. “Kak networks”

（3）c. computational

（4）c. single-layer

参 考 译 文

第 1 单元　硬 件 基 础

1.1　中央处理器

课文

数字计算机系统的硬件划分为四个功能部分。如图 1-1 所示，表示一台简化了的计算机的四个基本单元：输入设备、中央处理器、存储器以及输出设备。就整个计算机系统来说，每一部分都具有某种特定的功能。

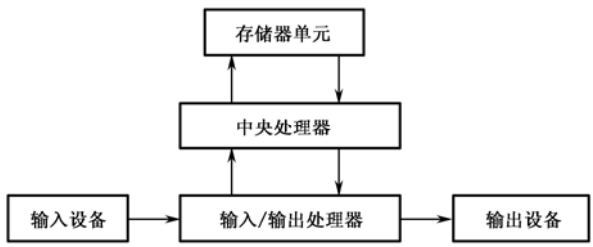

图 1-1　数字计算机的方框图

中央处理器是计算机系统的心脏。它负责实现由程序启动的全部算术运算和逻辑判断。除了算术和逻辑功能外，CPU 还控制整个系统的运行。

输入/输出设备是 CPU 和外部世界通信的手段。输入设备用来向 CPU 输入要进行处理的信息和命令。例如，键盘可以用来输入新的程序。经过处理所产生的信息必须输出。来自系统的这种数据输出是在输出设备的控制下实现的。计算机的存储器用来存储信息，如数字、名字及地址。在计算机系统中，存储器划分成两种不同的类型，称做主存储器和辅助存储器。

计算机能够解决一系列问题，做出成百甚至上千个逻辑判定而不感到疲劳和厌烦。计算机能够在人类做一项工作所需的一小部分时间内，就找到问题的答案。计算机可以代替人类做那些单调的日常工作，但是它没有创造力；计算机根据给它的指令工作，而不能行使任何有价值的判断。但是计算机几乎在瞬间就可以处理大量的算术逻辑运算。

微机上的 CPU 实际上是一个很小的集成电路芯片。虽然大多数 CPU 芯片比一块眼镜片还小，但所包含的电子元件在几十年前却要装满一个房间。应用先进的微电子技术，制造者能够把上万个电子元件集成到很小很薄的硅芯片上，这些芯片的工作性能可靠且不费电。中央处理器协调计算机各个部件的所有活动。它确定应该以什么顺序执行哪些操作。中央处理器也可检索存储器的信息并将操作结果存到存储单元里，以备以后参考。

计算机的基本工作是处理信息。为此，计算机可以定义为接收信息的装置，信息是以称为程序的指令组和称为数据的字符形式出现的。该装置可对信息进行算术和逻辑运算，然后提供

运算结果。程序的作用是指示计算机如何工作，而数据则为解决问题提供所需要的信息，两者都存储在存储器里。

人们认为计算机具有很多显著的功能。不过大多数计算机，无论是大型机还是小型机，都具有三个基本性能。

第一，计算机具有进行加、减、乘、除及求幂等各种算术运算的电路。

第二，计算机具有与用户通信的功能。如果不能输入信息和取出结果，这种计算机就没有多大用处。

第三，计算机具有进行判定的电路。电路能对如下事件做出判定：一个数是否小于另一个数？两个数是否相等？一个数是否大于另一个数？

CPU 可以是一个单独的微处理器芯片、一组芯片或者一个带有晶体管、芯片、导线和接点的插件板。在 CPU 方面的差别可以区分大型、小型和微型计算机。处理器由两个称为控制单元和算术逻辑单元的功能部件及一组称为寄存器的特殊工作区组成。

控制单元

控制单元是负责监督整个计算机系统操作的功能部件。在有些方面，它类似于智能电话交换机，因为它将计算机系统的各功能部件连接起来，并根据当前执行程序的需要控制每个部件完成操作。控制单元从存储器中取出指令，并确定其类型或对之进行译码，然后将每条指令分解成一系列简单的、很小的步骤或动作。这样，就可以控制整个计算机系统一步一步地操作。

算术逻辑单元

算术逻辑单元（ALU）是为计算机提供逻辑及计算能力的功能部件。控制单元将数据送到算术逻辑单元中，然后由算术逻辑单元完成执行指令所需要的算术或逻辑运算。算术运算包括加、减、乘、除。逻辑运算完成比较，并根据结果采取行动。例如，比较两个数是否相等，如果相等，则继续处理；如果不等，则停止处理。

寄存器

寄存器是处理器内部的存储单元。控制单元中的寄存器用来跟踪运行程序的所有状态，它存储如当前指令，下一条将执行指令的地址以及当前指令的操作数这样一些信息。在算术逻辑单元中，寄存器存放要进行加、减、乘、除及比较的数据项。而其他寄存器则存放算术及逻辑运算的结果。

指令

指令由操作码和操作数组成，操作码指明要完成的操作功能，而操作数则表示操作的对象。例如，一条指令要完成两数相加的操作，它就必须知道：这两个数是什么？这两个数在哪儿？当这两个数存储在计算机的存储器中时，则应有指明其位置的地址，所以如果一个操作数表示的是计算机存储器中的数据，则该操作数叫做地址。处理器的工作就是从存储器中找到指令和操作数，并执行每个操作。完成这些工作后，就通知存储器送来下一条指令。

CPU 以一系列步骤执行每一条指令：

1．从存储器取出一条指令，送入指令寄存器。

2．修改程序计数器以指向下一条指令。

3．确定刚取出指令的类型。

4．如果指令使用存储器中的数据，则须确定它们的地址。

5．取出数据并送到 CPU 内部寄存器。

6．执行指令。

7．将结果存储到适当的位置。

返回到第 1 步，开始执行下一条指令。

这个顺序执行的系列步骤常称为“取指—译码—执行”周期。所有计算机的操作都是以此为中心的。处理器以惊人的速度一遍又一遍地重复以上这些步骤的操作。一个称为时钟的计时器准确地发出定时电信号，该信号为处理器工作提供有规律的脉冲信息。计量计算机速度的术语引自电子工程领域，称为兆赫（MHz）。兆赫意指每秒百万个周期数。

阅读材料

微 处 理 器

微型计算机或简称微机是计算机的一种。它诞生于 20 世纪 70 年代初期。计算机的大脑称为微处理器。它是计算机内的主要芯片，可完成所有工作。它也是母板上的活动中心。它解释和执行构成计算机程序的指令。CPU 是由一个算术单元及其相关电路（称为算术逻辑单元）和一个指令计数器及译码器组成的。CPU 一次只能完成一个操作。实质上，数字化编码的指令存储于计算机的高速存储器或主存中，CPU 一次取一条指令并执行它。数字化编码的指令告诉 CPU 完成什么操作，以及操作所需的数据存储在什么地方。

称为微处理器的微机中央处理器是单片半导体装置。也就是说，实现计算机所有逻辑和算术功能所必不可少的成千上万个分立的电路元件都制造在一块芯片上。完整的微机系统由微处理器、存储器和外围设备组成。处理器、存储器和外围设备的电子控制装置通常一起放在一块或几块印制电路板上。使用微处理器的系统可以组合起来完成迄今为止只有小型计算机系统才能够做的工作。一般来说，微机的指令系统比小型机略为简单，灵活度稍低，而且比小型机明显慢得多。同样，小型机可以配置较大的内存容量。但是微机的功能变得越来越强，并与小型机技术结合起来了。

实质上，微处理器是一台小计算器，它可完成基本计算器所做的工作，即对存储在计算机内存的数据进行加、减、乘、除运算。计算机程序告诉微处理器做什么，这就是 PC 内的每件事的工作方式。

微处理器的其他一些叫法有处理器、中央处理器（CPU），以及由微处理器的编号命名的 8088、80286、80386、80486 等（注意：尽管微处理器有许多编号/名称，但上述这些微处理器是最常用的）。PC 使用的微处理器主要有三种：8088/8086、80286 或 AT 微处理器和 386 系列。不会有 586 微处理器，因为生产微处理器的 Intel 公司不再用编号命名，而是称其为奔腾（Pentium）微处理器。正是微处理器的这个“微”字才使一些老计算机用户称 PC 为微机。这可能适用于第一代微处理器，而目前发电站用的 PC 根本不“微”。

如何知道你的 PC 装的是哪一种微处理器呢？最好的办法是看一下标牌，上面可能有微处理器编号：386 和 486。作为最后一招，你可使用 PC 诊断软件来断定你使用的是哪一种微处理器。奔腾计算机是 386 系列的最新产品，是可能被称做 586 的奔腾。奔腾基本上是一种快速的、无所不能的 386。第一批 Pentium 推出后约一年的时间，出现了一个小问题。Pentium 在进行数学运算时出了问题，尤其是在做除法运算时问题更大。当除以两个特定的数字时，

Pentium 得出的结果不准确。Intel 公司马上承认了这个错误，并更换了 Pentium。后来他们解决了这一问题。现在出厂的所有新的 Pentium 运行非常好，再没有出现过数学运算差错。

1.2 存储器

课文

一个存储器单元是一个电路，或在某些情况下只是一个能存储一位信息的单个器件。存储器单元的系统排列组成了存储器。存储器也必须包括用来寻址的外围电路，并将数据写到单元内，以及检测存储在单元中的数据。

考虑两类基本的半导体存储器。第一类是随机访问存储器（RAM），是一种可读可写存储器，它的每个独立单元可以在任何指定的时间内寻址。对每个单元的访问时间实际上是一样的。RAM 的定义指出，每个单元都允许做读和写的操作，读和写所用的访问时间几乎相同。

第二类半导体存储器是只读存储器（ROM）。尽管这类存储器中所设置的数据在某些设计中可以改变，但这些数据通常是固定的。不过，在 ROM 中写入一个新数据所需要的时间比对存储器单元的读访问时间要长得多。例如，ROM 可用于存储系统操作程序的指令。

易失性存储器是一种当电路中电源断开时数据丢失的存储器，而非易失性存储器是即使电源断开数据也能保存的存储器。一般地，随机访问存储器是一种易失性存储器，而只读存储器是非易失性的存储器。

RAM 的两种类型是静态 RAM（SRAM）和动态 RAM（DRAM）。静态 RAM 由基本的双稳态触发器电路组成，它只需要直流电流或电压以保持记忆。静态 RAM 有两个稳定状态，定义为逻辑 1 和逻辑 0。动态 RAM 是 MOS 存储器，当在一个电容上充电时它存储一位信息。由于电容上的电荷会延迟一个固定的时间常数（毫秒级），需要有定期重新存储电荷的刷新使得动态 RAM 不丢失它存储的信息。

SRAM 的优点是这个电路不需要额外复杂的刷新周期和刷新线路，但它的缺点是电路相当大。一般地，SRAM 的一个位需要六个晶体管。DRAM 的优点是它的一个位只由一个晶体管和一个电容组成，但缺点是需要刷新线路和刷新周期。

ROM 一般有两种类型。第一种既可以由制造厂家编程（掩模可编程的），也可以由用户编程（可编程的或 PROM）。一旦 ROM 采用了任何一种方法编程，存储器中的数据就固定了且不能改变。第二类 ROM 可以认为是一种可改变的 ROM，如果需要的话，ROM 中的数据可以重新编程。这类 ROM 可以叫做 EPROM（可擦除可编程的 ROM），EEPROM（可电擦除的 PROM）或闪存。正如前面提到的那样，这些存储器中的数据可以重新编程，尽管所包含的时间远远长于读访问时间。在某些情况下，在重新编程过程中，有可能不得不从电路中移走存储器芯片。

基本的存储器结构如图 1-2 所示。端点的连接可以包括输入、输出、地址、读和写控制信号。存储器的主要部分是数据存储体。一个 RAM 存储器将包括上面提到的所有连接端点，而一个 ROM 存储器不包括输入和写控制信号线。

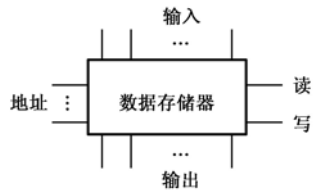

图 1-2　基本存储器结构

计算机内存以信息的千字节或兆字节来度量。1 个字节等于存储一个字符，如一个字母或数字的存储量。1KB 等于 1024 字节，1MB 约等于 1 000 000 字节。软件需要一定数量的内存来正常工作。如要给计算机增加新的软件，在软件包装上通常可以找到该软件所需要的确切内存容量。

存储器由许多单元组成，每个单元可以存储一个信息。每个存储单元有一个号码，叫做单元地址。通过地址，程序可以访问存储单元。假定存储器有 n 个单元，它们就有地址编号 0~n−1 个。存储器的所有单元具有同样的位数。如果一个单元有 k 位，它可以保存 2^k 个不同位组合数据中的任一个。注意相邻的单元具有连续的地址。

使用二进制（包括使用对二进制数的八进制和十六进制的记数法）的计算机，也用二进制表示存储器地址。如果地址有 m 位，可直接寻址的最大单元数量是 2^m 个。地址的位数与存储器可直接寻址的最大单元数量有关，而与每个单元的位数无关。具有 8 位长的 2^{12} 个单元的存储器和具有 64 位长的 2^{12} 个单元的存储器都需要 12 位地址。

单元表示它是最小的可寻址单位。近年来，大多数计算机制造商已经使其长度标准化为 8 位，这样的单元叫做字节。字节可组成字，16 位字长的计算机每个字包含 2 个字节，而 32 位字长的计算机每个字则包含 4 个字节。字的含义是大多数指令对整字进行操作，如把两个字相加在一起。因而 32 位机器有 32 位的寄存器和指令，用以实现传送、加法、减法和其他 32 位字的操作。

20 世纪 70 年代，计算机有了进一步的发展，使计算机领域发生了一场革命。这就是将成千上万个集成电路蚀刻在一小块硅（芯）片上，硅芯片是具有半导体特性的非金属元件。芯片上具有成千上万个相同的电路，每个电路能存储一位。由于芯片很小，且电路蚀刻在芯片上，电信号无须行进很远，因此它们传输得较快。此外，装有电路的部件体积可以大大减小，这一进步导致了小型机和微型机的引入。其结果是计算机体积变小，速度加快，价格更便宜。可是半导体存储器有一个问题：当电源切断时，存储器里的信息就会丢失，它不像磁芯存储器，在断电时还能保留信息。

在实模式下运行的 80x86 系列处理器，其物理寻址能力达到 1 兆字节。EMS 采用页面调度或存储切换技术，使得微处理器能访问更大的存储空间。为了扩展存储器，需要额外的硬件和驱动程序。存储切换寄存器作为有 1 兆字节空间的物理窗口和驻留在扩展存储器上的逻辑存储器之间的信闸。设备驱动器，也称为扩展内存管理（EMM），它控制寄存器，使得程序的存储器存取在整个可用的扩展存储器上以实现重定向。

为了访问扩展存储器，程序需要与 EMM 联系。与 EMM 通信的方式与调用 DOS 类似。程序中设立了专门的 CPU 寄存器并建立了一个软件中断请求，同时定义了 30 多个功能，并用应用程序和操作系统来控制扩展存储器。当一个程序装入扩展存储器页中时，EMM 就将一个标志回复给这个请求程序。当再次调用 EMM 时，这个标志将用来区分逻辑页中哪些块被用过。

阅读材料

高速缓存和磁盘

多种不同类型的高速缓存（磁盘高速缓存、内存高速缓存、处理器高速缓存）都能改善系统总的性能。尽管许多高档的系统在系统设计中就包含了高速缓存，但是，从低档 8086 系统直至以 i486 为基础配置的最高性能系统，高速缓存都可以作为选件加以实现。

有两种通用的方法实现磁盘高速缓存。这两种方法的主要区别在于用做高速缓存的存储器位于什么地方。磁盘高速缓存的第一种，也是最常用的实现方式是使用扩展内存。在一台微机中，1MB 或者更大的扩展内存可分配作为磁盘高速缓冲存储器。“命中”率（指对磁盘的数据读取能从高速缓存中读出，而不是从磁盘中读出）越高，系统总的性能就越好。对于文字处理或管理小的文件，一个大的高速缓存可能用处不大。对于管理复杂图形的大的数据库文件，利用扩展内存作高速缓存，可明显地提高性能。磁盘高速缓存的第二种形式是通过高速缓存控制器来实现的。这些控制器不仅能控制联机的硬盘驱动器的读/写操作，它们也提供完成很多基于系统的扩展存储器高速缓存的功能。然而，把高速缓存置于控制器上，高速缓存的性能可以比多数使用扩展内存作高速缓存的性能好得多。

在高速缓存控制器上采用了高速存储器，当系统调用硬盘时，控制器上的高速缓存确定被调用的数据是在高速缓存中，还是在磁盘上。当使用扩展内存作高速缓存时，高速缓存截获对硬盘进行读操作的调用，以检查被系统调用的数据是否在高速缓存中。如果数据不在高速缓存中，就向磁盘控制器发送一个读指令。这个处理过程要花时间。这不仅仅是由于高速缓存的扩展内存存储器的速度要比高速缓存控制器中的存储器速度慢，而且在磁盘控制器被指示到磁盘检索出所需要的数据之前，还要采取额外的步骤。然而，通过让处理器向高速缓存控制器发调用，再由后者确定磁盘是否实际读出，性能便可以显著提高。一些高速缓存控制器厂商声称，使用智能高速缓存控制器，可使性能大为改善。高速缓存控制器已经在大型计算机系统上使用多年，将它们向微机上移植，可以看做是合乎逻辑的下一步。

磁盘主要有软盘、硬盘两种。这两种盘都是由涂敷磁性介质的可旋转的盘片构成的，由一个可移动的读/写磁头来存取信息。磁盘存储器是非易失性的，就是说即使掉电，磁盘内的数据也不会丢失。由于硬盘中盘片是金属的（最近也出现玻璃的），因此比软盘有更多的优越性。

每个用户都喜欢使用硬盘，因为它有巨大的存储容量和快速的工作速度，特别是在操作系统愈来愈大的时代。例如 Windows 98，它的全部安装需要 300MB 存储空间，长的应用程序和多媒体的发展需要的存储空间也愈来愈大，所有这些都刺激了硬盘的发展。硬盘存储容量几乎每年都加倍增长而且工作速度越来越快。硬盘电动机主轴的旋转速度是硬盘的工作速度。一般来说，这个速度从 5400 ~7200 rpm。高的旋转速度可以减少平均寻道时间和等待时间。大部分平均寻道时间都低于 10ms。硬盘的存储容量发展很快，几乎每年增加一倍。存储容量越大，则每位存储价格越低。用户应根据自己的经济能力和经验来选择合适的硬盘。

为了存取数据，操作系统必须引导磁盘经过三个阶段的处理。第一步是把机械臂定位在正确的磁道上。这个操作称为寻道，把机械臂移动到所希望到达的地方的时间叫寻道时间。一旦磁头已经到达正确的磁道，还必须等待所希望的扇区转到读/写磁头下。这个时间叫旋转等待时间或叫旋转延迟时间。得到所要信息的平均等待时间一般是磁盘一周的一半。小直径的硬盘因为能以更高的速度旋转而不过多地消耗能量，而减少了旋转等待时间则更具有吸引力。磁盘存取的最后一个组成部分——传送时间，指传送一块数据——典型的是一个扇区数据的时间。

它是传递信息容量、转动速度和磁道记录密度的函数。

1.3 输入/输出系统

课文

键盘

如果你熟悉打字机，那么你会发现计算机键盘的布局与其非常相似。使用键盘可以进行如下工作：

- 输入信息。
- 用数字小键盘输入数字。
- 请求特殊功能。
- 用键组合执行系统功能。
- 在屏幕上移动。

键盘有字母键、标点符号键和一个空格键。它还有功能键、数字键和箭头键。如何使用这些键，取决于计算机上所安装的软件。软件所带的资料包含关于特殊键功能的信息。你也许注意到了计算机键盘与打字机的感觉有所不同。计算机的键盘非常敏感，只需轻轻触摸便可输入。当保持按下一个字符键时，该字符将持续输入。这就叫做计算机键盘的复击效应。

显示器

显示器也许是最重要的输出设备之一。计算机只能用它们来显示有趣的结果和神奇生动的画面。显示器也是人机对话的最好窗口，所以很多用户选择显示器时非常小心。选择显示器时应该注意哪些参数和指标呢？这里给出一些参数仅供参考。

像素距离：两个像素水平方向的距离称为像素距离。目前大多数 PC 显示器的流行像素距离是 0.28mm。这个值越小，屏幕越清晰。

视频带宽：它是显示器技术中一个很重要的概念，它关系到显示器的最高工作频率。它的范围从几十兆赫到几百兆赫。

分辨率：它是显示器的另一个重要参数，其值越高，屏幕上的图像越清晰。分辨率表示一个屏幕上全部像素的总和。

扫描方式：显像管中的电子枪的扫描方式有两种——隔行和非隔行。在隔行方式中，电子束首先扫描奇数行中的像素，第二次再扫描偶数行中的像素。一帧画面的更新需扫描两次。在非隔行方式中，电子束一次完成扫描全部像素。在这种工作方式中，显示器工作得更好而且图像清晰、不闪烁。

鼠标

鼠标与系统之间的接口可以采用如下两种方式之一：通过鼠标的移动产生一系列脉冲（使用 LED 和检测器产生脉冲）；利用鼠标使计数器增值或减值。处理器能定期读取这些计数器中的值或对脉冲计数，并且确定自上一次检测点处算起鼠标移动了多远。然后系统把光标移到屏幕的恰当位置。这种移动看起来是很平滑的，因为鼠标的移动速度与处理器读取鼠标的位置，以及移动屏幕上光标的速度相比是很低的。

大部分鼠标还装有一个或多个按钮，并且当按钮按下时，系统必须能够及时检测到。依靠对按钮状态的监测，系统也就能区分单击按键与按着按键拖曳之间的差别。当然，计数器与按键实际位置之间的转换以及屏幕上的变化都是由软件控制的。这也正说明了为什么鼠标在屏幕上的移动速度，以及鼠标按键是单击还是双击的识别速度能够由用户来设定。同样，用软件描述鼠标位置，也意味着当鼠标沿一个方向长距离移动时，光标不会完全跳离屏幕。

光盘

光盘是由激光在其表面对数据编码蚀刻的盘片。它提供的信息密度远远超过现行的磁性大容量存储设备的范围。类似的设备已经在市场上出现了几年的时间，以激光视盘和音频致密光盘（CD）的形式供用户使用。这些激光视盘是模拟的，即光盘包含了像唱片那样的一条螺旋记录道。用于计算机的光盘是数字式的，像磁盘一样，信息存储在同心道上。目前，有三种类型的光盘技术竞争大容量存储器市场，它们是只读光盘、一次写入型光盘和可擦除光盘。

与常规的磁盘不同，只读光盘不可写入，所以与只读存储器有等价的功能。最流行的只读光盘的版本采用的技术与已流行的用于音频唱片的 CD 技术相同。这种技术是数字式的，并且基于单面能存储 540MB 的 4 3/4 英寸的光盘。这种设备叫做致密光盘只读存储器（CD-ROM）。

一次写入型光盘（也称一次写入多次读出，或 WORM）是由用户记录的空白盘。为了写入数据，激光的强大光束将覆盖在光盘的表层并烧结出小斑点或凹点。一旦烧出，这些斑点就不能擦除。为了检索数据，使用不太强的激光去读斑点的模式，并且把该模式转变为可以在电视机上播放的视听信号。一次写入型光盘可用来代替微缩胶片存储器。因为光盘具有存储图像和声音的能力，它们的用途是多方面的。任何能够被数字化的事物，比如文件、图像、照片、图画及音乐都可以记录和存储在光盘上。

可擦除光盘使用激光从光盘读出或向光盘写入信息，不过盘的表面也使用磁性材料和磁性写磁头以获得可擦性。为了向盘写入，激光束在盘上加热成小点，接着提供一个磁场以改变点的磁性。可擦除光盘系统既提供了与非擦除光盘相同的存储能力，又具有同 Winchester 系统那样的常规磁盘的重复使用能力。

总线

总线是共享的通信链路，它用一束通信线来连接多个子系统。总线结构的两个最主要的优点是：灵活性和廉价性。通过定义一种连接方式，可以很容易地增加新设备，甚至也可将外围设备在两个使用同类总线的计算机系统间移动。此外，总线能被有效地使用，因为一条总线可以多种方式共享。总线的最大缺点是它产生通信瓶颈，可能限制最大的 I/O 流量。当 I/O 必须经过一条总线时，总线带宽限制了最大 I/O 流量。

总线设计如此困难的一个原因是，总线的速度很大程度上受物理因素限制：总线长度和设备数量。这些物理因素使我们不能以任意高速使用总线。在这些限制下，尽管可用许多技术来提高总线的性能，但是，这些技术也会对其他性能产生不利影响。例如，为获得较快的 I/O 响应时间，必须用流水线化通信路径来最小化总线延时。另一方面，为维持高速 I/O 数据速率，必须最大化总线宽度。使用更大的缓冲器和用更大的数据块通信能增加总线宽度，但两者都增加总线的延时。显然，低延时和高带宽这两个目标，会导致设计要求的冲突。最后，要求设备支持具有不同延时和数据传输速率的各种各样的需求，也使总线设计面临挑战。

一条总线一般包括一束控制线和一束数据线。控制线被用于标记请求和应答，并且指出数

据线上信息的种类。总线的数据线在源地和目的地间运送信息。这种信息可以包括数据、复杂命令和地址。比如，磁盘想要从某个扇区往内存中写数据，数据线就用于指明内存中的哪个地址用于存放数据，并且在实际上将数据从磁盘输入到内存，控制线用于指出传输的每一时刻数据线上都包括哪种类型的信息。一些总线有两束信号线，在一个总线传输中分别传输数据和地址。在任何一种情况下，控制线都用于指出总线包括什么并且执行总线协议。

阅读材料

MP3 文件是如何工作的

MP3 格式是音乐的一个压缩系统。MP3 格式是在没有损害歌曲声音质量的情况下降低一首歌的存储容量。MP3 格式的目标是在没有影响 CD 音质的情况下压缩至 10%~14%。在 CD 上一首 32 兆字节的歌曲通过 MP3 技术可以压缩到大约 3MB。这样下载一首歌曲只需几分钟，而不是几个小时，在你的计算机硬盘上不用占多少空间就可以存储几百首歌曲。

不损害质量来压缩一首歌，可能吗？我们总是对图像使用压缩算法。例如，一个 GIF 文件是一幅压缩的图像。JPG 文件也是一样。我们创建压缩文件来压缩文本。因此对图像和字的压缩算法熟悉并且知道它们十分有效。为声音做好压缩算法，使用一种叫做感性的噪音的技术。它是“感性”的一部分原因是 MP3 格式使用人耳的特征设计压缩算法。例如：

- 有某些声音人耳朵听不见。
- 对于某些声音，人耳听得比其他生物更清楚一些。
- 如果有两个声音同时响，我们能听见更大声的一个但是不能听见小声的那个。

基于这些事实，可以消除一首歌的一部分，而不会很大地伤害它的质量。然后用著名的压缩技术压缩余下部分使歌曲相当小——至少为原来的 10%。当创建了一个 MP3 文件，得到的是“近似 CD 质量”的歌曲。MP3 版本的歌曲和 CD 版本的歌曲听起来并不完全一样，因为有一部分被消除了，但是十分相近。

从描述中可以看出，MP3 并没有什么神秘。它只是一种把歌曲压缩得更小的文件格式。这使得歌曲更容易在网络上传播和存储。

在网络上，能下载 MP3 文件的网站有几千个。到其中一个网站去，找一首歌曲并下载到硬盘。大部分歌曲的介于 2 ~4MB 之间，因此需要花 10~15min 下载，除非有一个高速的互联网连接。一旦歌曲下载完毕，试着双击文件看会如何。如果计算机能够播放它，那就已经安装好了。

如果发现不能播放，那么需要下载一个 MP3 播放器。有非常多可用的播放器，并且大多数是免费的或是共享软件。其中最流行的是 WinAmp，能从网站 www.winamp.com 下载。

现在可以开始收集 MP3 文件并且保存在计算机上了。许多开始收集 MP3 文件的人发现他们想要在各种地方都能听音乐。小而便携的 MP3 播放器正好符合了这些需要。将这些播放器插进计算机的并行接口、FireWire 或 USB 端口以传输数据，并且在应用软件的支持下，只要简单地拖放文件，就可以把 MP3 文件转移到播放器上。

如果有一盘 CD 并且想把 CD 中的歌曲转换成 MP3 文件，可以使用 ripper 和编码器软件去做。ripper 可以将歌曲从 CD 复制到硬盘上。编码器则将歌压缩为 MP3 格式。编码后，就可以在计算机上播放它们，或者复制到 MP3 播放器中随身携带。

将 MP3 文件写到数据 CD 上，这样就能保存它们并且空出一些硬盘空间。然后就可以在计算机上听这些文件。现在一些汽车的立体声和 DVD 播放器也可以播放这些编码数据的 MP3

文件。

如果你是一个艺术家，经常在家里或是小工作间录制音乐，就可以用 MP3 文件和网页来发布你的音乐，那样就有很多的听众。第一步是在一盘盒式录音带、微型磁盘或者 CD 上创建一首歌曲。如果是在 CD 上，可以使用前面介绍的 ripper 和编码工具创建一份 MP3 文件。如果是在一个盒式录音带上，连接磁带的输出到机器声卡的输入或麦克风上，就可以把音乐记录到计算机中。然后就能编码那份文件创建 MP3 文件了。

第 2 单元　软 件 知 识

2.1　C 语言

课文

C 是一种通用的结构化编程语言，它的指令是由一些类似代数表达式的项加上一些英文关键字如 if、else、for、do 和 while 而组成的。从这方面讲，C 语言类似于其他高级结构式编程语言。可是，C 还另有一些特点。这些特点使它能在较低层次上应用，因而能弥补机器语言和惯用的高级语言之间的差距。这种灵活性使 C 可以用于系统编程（如编写操作系统），也可以用于应用编程（例如，编写解数学方程式的复杂系统的程序或者编写给顾客开账单的程序）。

C 语言的研制开始于 20 世纪 70 年代初期。C 语言也许最适宜被称为“中级语言”。像真正的高级语言一样，一个 C 语句与编译到机器上的语言指令的关系是一对多的关系。因此，像 C 这样的语言的编程手段远远超过低级的汇编语言。然而，与大多数高级语言相比，C 语言有一个小的结构集。另外，与大多数高级语言不同，C 语言能使操作者很容易地做由汇编语言执行的工作（如位与指针的操作）。

结构化语言

尽管块结构语言这个术语从学术上考虑并不能严格地应用于 C 语言，但是 C 语言是那个语言族的非正式成员。块结构语言的显著特征是代码和数据的区域化，这意味着语言能够把完成某个具体任务所必须的所有信息和指令及程序的其余部分分割开并隐藏起来。一般地，区域化是利用含有局部或临时变量的子程序获得的。用这种方法，用户可以编写各种子程序，在这些子程序内部发生的事件对程序的其他部分不会引起副作用。过度使用整个程序都理解的全局变量会在程序中引起错误及意想不到的副作用。在 C 语言中，所有的子程序都是独立的函数。

函数是 C 语言的组成模块，程序的所有活动都发生在函数中，它们允许用户分别定义和编写程序中的各个特定的任务。使用局部变量的函数调试过后，用户就可以依赖它在各种情况下良好地工作，不会在程序的其他部分产生副作用。在某个函数中定义的全部变量只有那个函数才认识。

C 程序由一系列函数组成，程序的执行必须以称为 main ( )的函数开始，包含在程序中的其他函数由程序员命名。当函数名在程序中以一个语句的形式出现时，程序的执行转到那个函数，当被调用函数执行完时，将把一个结果返回给调用函数。如果一个函数调用另一个函数，那么第二个函数说成是嵌套在第一个里的。在许多情况下，当一个函数被调用时，有信息传送给它，这个信息包括在函数名后的一对括号内。被调用函数也将返回一个值给调用函数。

说明和定义

在 C 语言中，说明和定义之间的区别很细微，但是非常重要。说明把数据类型和标识符联系起来，但却不给标识符分配存储空间。而定义却实际上分配内存。建立全局变量时，说明和定义之间的区别特别重要。

全局变量（也叫“外部变量”）是不同源文件中的模块可以访问的变量。即全局变量具有全局工作域。下面是建立全局工作域的三种方法。

- 使用存储类标识符“extern”在顶层建立一个变量。这就产生了一个变量说明。一个这样的说明不能包括初始程序。可在文件中的其余部分访问此全局变量。
- 使用存储类标识符“extern”在块首建立一个变量。这就产生了一个变量说明。一个这样的说明不能包括初始程序。只能在声明的块中访问此变量。
- 在顶层建立一个变量并省略存储类标识符。这就产生了一个变量定义。一个这样的定义可包含一个可选的初始程序。

在 C 语言中，每个全局变量都可说明零次或多次（在不同文件中），但是必须至少定义一次，并可以在不同的文件中定义多次。然而，不能在同一文件中多次定义一个全局变量。若在多个文件中明确地把变量初始化，则联编程序所读的最后一个初始程序是变量运行期的初始值。因此，赋值命令中文件的排列顺序决定外部变量的初始值。若没有初始化全局变量，则它的默认值为零。

变量的持续时间就是将存储空间分配给变量的这段时间。持续时间有两种：动态的和固定的。每当程序进入变量说明块时，一个动态持续变量就会重新建立。程序离开该块时，该变量消失；相反，一个固定持续变量在执行整个程序的过程中一直存在。

可以把固定变量和动态变量的区别总结如下。

- 固定变量在从一个块到另一个块的调用过程中其值不变，而动态变量在每次停用该块时失去对应的值。
- 若不明确地初始化固定变量，则固定变量得到的默认值为零。然而，若不明确地初始化动态变量，则编译程序将不替操作者初始化动态变量。
- 实时系统只初始化一次固定变量，而对于动态变量，若用初始化程序说明，则每当进入动态变量块时，就重新初始化。

变量作用域就是变量在源代码上有效的区域。若变量有效，则意味着可在源代码中使用该变量。若变量无效，却试图在源代码中使用该变量，则编译程序报告出错。

作用域有四种：块、函数、文件和全局。块作用域指从变量说明到块结束之间，变量有效。函数作用域指从变量说明点到函数结束之间，变量有效。文件作用域指从变量说明点到文件结束之间，变量有效。全局作用域指对整个程序（包括构成该程序的源代码的所有文件）变量都有效。

特点

C 语言的特点是它能写出很简明的源程序，其部分原因在于该语言中包括大量的运算符。它的指令集相对较小，不过实际的实现包括大量的库函数，这些库函数增强了基本指令。此外，该语言鼓励用户编写其自己的附加库函数。因此，用户可以方便地扩展 C 语言的属性和能力。

C 语言的编译程序普遍适用于各种容量的计算机，并且 C 语言的解释程序正变得越来越普通。编译程序是紧凑的，它们生成的目标程序较之由其他高级语言编译所得的程序要短小并

且高效。尽管开发新程序时，使用解释程序较容易，但效率低。许多程序员都从解释程序开始，一旦程序调式完毕（即一旦编程错误全部排除以后）便转用编译程序。

C 语言的另一个重要特点是它的程序具有高度的可移植性，与其他高级语言相比，就更是如此。其原因是 C 把大多数与计算机有关的特性都归进了它的库函数。因此，每个版本的 C 语言都伴有它自己的库函数集，这些库函数集是按主机的特点而编写的。这些库函数是相对标准化的。一般而言，不同版本的 C 语言访问库函数的方法都一样。因此，大多数 C 程序可不作任何修改或作很少改动就在许多不同的计算机上被处理。

阅读材料

编 程 语 言

一些术语

计算机程序——一个程序就是一个指令集，它将精确地告诉计算机要做什么。这些指令可能是执行一串数字的相加，或者是比较两个数的大小，并根据结果做出决策，或是其他的。但是一个计算机程序只不过是一个计算机指令序列。计算机精确地遵循指令，并且在这个过程中做一些有用的事情——如平衡一个账本，在屏幕上显示一个游戏或实现字处理器。

编程语言——为了让计算机识别给出的指令，这些指令要用一种计算机能理解的语言——计算机语言来写。有很多的编程语言——Fortran, Cobol, Basic, Pascal, C, C++, Java, Perl——就像有很多的口语一样，它们用不同的方式表达大约相同的意思。

编译器——编译器把能够理解的计算机语言翻译成机器可以执行的形式。你很可能已经看到机器上的 EXE 文件了。这些 EXE 文件就是编译器生成的结果。它们包含翻译后的机器能识别的程序。

面向过程的程序设计——面向过程的程序设计包括用程序设计语言建立存放值的存储单元，编写对这些值进行运算的一系列步骤或操作。计算机存储单元称为变量，因为它们所保存的值可以变化。为方便起见，一个计算机程序的各个操作通常被组合成逻辑单元，称为过程。面向过程的程序定义了可变的存储单元，然后调用或引用一些过程对这些单元中的值进行输入、操作和输出。一个面向过程的程序通常包括成百上千的变量和过程调用。

面向对象的程序设计——面向对象的程序设计是面向过程程序设计的一种扩展，在编写程序时采用的方法有一些不同。用面向对象的方法考虑问题，首先把程序元素看成是与现实世界中的具体对象相似的对象，然后对这些对象进行操作以得到期望的结果。编写面向对象的程序包括创建对象和创建使用这些对象的应用程序。

机器语言和汇编语言

能被计算机操作系统直接运行的计算机程序称为可执行程序。可执行程序是以机器码的形式表示的一系列非常简单的指令。这些指令对于不同计算机的 CPU 而言是特定的，它们与硬件有关。机器码指令数量很少（根据计算机和 CPU 的不同而有差异）。典型的指令是从存储单元取数据，或将两个存储单元的内容相加（通常在 CPU 的寄存器中进行）。机器码指令是二进制的——也就是比特序列（0 和 1）。

与机器语言指令相比，汇编语言使用的命令较容易为程序员所理解。每条机器语言指令在

汇编语言中都有等价的命令。例如，在汇编语言中，语句“MOV A, B”命令计算机把数据从一个单元复制到另一个单元，而机器代码中同样的指令是由一串 16 位的 0 和 1 组成的。一旦汇编语言程序编写完毕，它就由另一个称之为汇编器的程序转换成机器语言程序。因为与机器语言代码一致，汇编语言速度快，功能强。可它仍然难以利用，因为汇编语言指令是由一系列抽象代码组成的。另外，不同的 CPU 使用不同的机器语言，因此需要不同的汇编语言。有时为了执行特殊的硬件任务，或者为了加快高级语言程序的速度，汇编语言被插入到高级语言程序中。

高级语言

高级程序语言是这样一种编程手段，它用规范化的术语来写出一步步的程序步骤，执行这些步骤时会用唯一确定的方式处理给定的数据集。高级语言与任何给定的计算机无关，但假定将使用一台计算机来进行处理工作。高级语言经常针对某类特殊的处理问题而设计，例如，一些语言设计成适宜处理科学计算问题，另一些语言则更侧重于文件处理的应用。

像 C++这样的面向对象程序设计语言（OOP）是以传统的高级语言为基础，但是它们能使程序员按照组合对象集方式而不是指令列表方式来进行思考。对象的类可以从其他对象类那里继承属性。例如，一个定义正方形的类能从定义长方形的类那里继承诸如直角这样的属性。程序类的这种关系简化了程序员的工作，从而产生了更多既可靠又高效的程序。面向对象程序设计能提高软件的可靠性。由于对象在不同的应用中受到反复检验，错误有更多的可能被查出和纠正。面向对象程序设计在并行处理中也有潜在优势。在面向对象的方法下，并行处理的执行速度将得到提高。

2.2 数据结构

课文

数据结构是一种数据类型，其值是由与某些结构有关的组成元素所构成的。它有一组在其值上的操作。此外，可能有一些操作是定义在其组成元素上的。由此可知：结构数据类型可以有定义在构成它的值之上的操作，也可以有定义在这些值的组成元素之上的操作。

数据类型

数据类型的本质是标识一组个体或目标所共有的特性，这些特性把该组个体作为可识别的种类。如果提供了一组可能的数据值以及作用在这些数据值上的一组操作，那么，这两者结合在一起就称之为数据类型。

让我们看两种数据类型，任何由原子值构成的数据类型称为原子数据类型，通常我们倾向于把整数作为原子。那么，我们关心的仅仅是一个值所代表的单个量，而不是把整数看成是一个在某些数字系统中的数字的集合。在许多程序设计语言和计算机体系结构中的整数类型是一个常用的原子数据类型。

人们可以将其值由某种结构相关的组成元素构成的数据类型称为结构化数据类型或数据结构。换句话说，这些数据类型的值是可分解的，因此我们必须知道它的内部结构。任何可分解的目标有两个必要的组成成分——必须具有组成元素和结构，亦即将这些元素相互关联或匹配的规则。

栈和队列

栈是一种数据类型，它的主要性质是由对其节点的插入与删除的管理规则来确定的，被删除或移去的节点只能是刚刚插入的，就是所谓具有后进先出（LIFO）性质或协议的结构。栈这种数据类型虽然简单，但并不影响其重要性，许多计算机系统的电路中都含有多个栈，并且含有操作硬件栈的机器指令。多重子程序的调用和返回伴随着栈的操作，算术表达式的计算通常是通过对栈的一系列操作来实现的。大多数袖珍计算器都是用栈模式来操作的，在学习计算机科学时，人们能看到许多栈的例子。

队列的例子在日常生活中经常出现并且为我们所熟悉，在银行等待服务或在电影院门口等待买票的一队人，在交通灯前面等待通行的一长串汽车都是队列的例子。队列的主要特征是遵循先来先服务的原则。与栈最后插入的元素是最先删除或服务的不同，在队列中，最先插入的节点将最先被服务。这样的原则与社会生活中人们公平合理的想法是一致的。

队列的先进先出（FIFO）原则在计算机中有很多应用。例如，在多用户分时操作系统中，多个等待访问磁盘驱动器的输入/输出（I/O）请求就可以是一个队列。等待在计算机系统中运行的作业也同样形成一个队列，计算机将按照作业和 I/O 请求的先后次序进行服务，也就是按先进先出的次序。另外，还存在着一种重要的队列：这在日常生活中也是可以看到的，比如，在医院的急救室内，在危重病人多的情况下，医生必须首先抢救生命垂危的病人。

在计算机系统中，要求计算机系统服务的事件通常根据最重要的事件最先服务来处理，换句话说，是按服务优先级最高先进/先出队列（HPIFO）的原则，这种队列称之为优先队列。优先队列并不按时间的先后决定服务的次序，而是按照优先级越高越优先服务的原则。

归并排序

有两个子表，每个都已经有序，可以将它们合并成另一个有序表。像这样一个简单而有效的合并过程称为归并排序，从元素的两两比较开始——每个子表各取一个元素，最小的元素被添加到有序表中，该位置上的数据被子表中的下一个元素所代替。继续这一工作，直到其中的一个子表中没有元素为止。然后将另一个子表中余下的元素追加到有序表中，则排序完成。

当一开始就有两个有序子表时，这方法听起来不错。如果有序子表不存在，则问题是决定如何开始？有几种可用的方法。

一种方法是把每个元素看成长度为 1 的有序子表。将每一对这样的子表合并成长度为 2 的有序表。然后再将每一对这样的有序表合并成长度为 4 的有序表。继续这一过程，直到仅仅剩下一个有序表为止。

注意，归并排序需要两个数组——数组 r 用来存放被排序的原始数据，数组 t 具有相同的类型。两两合并——首先从 r 到 t，然后再从 t 到 r。因此，归并排序需要 $2\times n$ 个元素的存储空间。

函数调用

当进行一个新函数调用时，所有局部于调用程序的变量，都需要由系统存储起来，否则新函数将要重写调用程序的变量。而且调用程序的当前位置也必须保存，以便新函数知道它运行后返回何处。变量通常由编译器分配到机器寄存器，而且尤其是涉及递归时，肯定会有冲突。

调用函数时，所有需要存储的重要信息如寄存器值和返回地址，都以抽象方式存储于“一片纸”上，且放在一个堆的顶端。然后控制转向新函数，新函数可自由地用它的值替换寄存器的值。如果它再做其他函数调用，则可进行同样的步骤。当函数要返回时，先查看在堆顶的“纸

片”，并恢复所有寄存器，然后进行返回跳转。

显然，所有这些工作都可用栈来完成，而且实际上每一种实现递归的程序语言中都是这样做的。保存的信息称为活动记录或栈框架。现实计算机中的栈常常由内存部分的高端向下延展，并且在很多系统中没有溢出检查。而且总是有可能，由于同时运行太多的函数而溢出栈空间，不用说，栈空间溢出是个致命的错误。

在对栈溢出不做检查的语言和系统中，程序可能没有合适的解释就崩溃了。在这些系统中，当栈太大时，常常会发生奇怪事情，因为你的栈可以延伸进你的程序部分。它可能是主程序，也可能是部分数据，尤其是当有一个大型数组时。若它跑进你的程序，则程序可能会错误百出，并会产生一些毫无意义的指令，且此指令一经执行就会崩溃。如果栈延伸至数据，可能发生的情况是，当向数据中写入某内容时，它将会破坏栈的信息——或许是返回地址——接着程序将会试图返回到某个古怪地址并崩溃。

阅读材料

面向对象的数据结构

面向对象的程序设计是一种现代的软件开发方法，用这种方法设计的软件具有高的可靠性和灵活性。软件系统实现的复杂性包括信息表示的复杂性和对这些表示进行操作的算法复杂性。数据结构则是研究一些方法，这些方法用来表示对象、安全可靠的封装结构、研发采用这些表示的算法以及测量因此而得到的系统的时空复杂度。面向对象的方法强调对象的作用以及它们的属性和操作，这些构成了解决问题的核心。

在特定类中，从决定使用何种数据结构来表示对象的属性这一点来看，面向对象方法中对抽象的强调，在软件开发过程中是非常重要的。抽象意味着隐藏不必要的细节。过程抽象或算法抽象是对算法隐藏细节的，允许算法在各个细节层次上可见或被描述。建立子程序是抽象的一个实例，子程序名描述了子过程的功能，子程序内部的代码表示了处理过程是如何完成的。

类似地，数据抽象隐藏了描述的细节。一个明显的例子是通过把几种数据类型组合来构建新的数据类型，每种新类型描述了一些更复杂的对象类型的属性或组成。数据结构中面向对象的方法是通过把一类对象的表示整合，将数据抽象和过程抽象组合在一起的方法。

一旦选择了一个合适的抽象，就有一些选择来表示数据结构。在许多情况下，至少有一种静态表示和一种动态表示，在静态和动态表示中，典型的折中方法是介于针对存储空间的增加选择边界或非边界的表示，以及和一些非边界表示有关联的时间需求之间。

在选择了抽象和表示后，就有各种不同的方法来封装数据结构。对封装的选择是另一种权衡，在如何使结构对用户有用和包怎样来操作用户的示例对象之间进行。封装对表示的完整性及与封装相关的时间、空间需求都有影响。一旦说明以后，一种或多种竞争的表示方法将被执行，与解决的问题有关的结构、表示和封装将被评价。每种方法的时间和空间需求必须相对于系统需求和约束被衡量。

由于面向对象程序设计把对象当做数据结构，所以它不同于过程程序设计。结构化数据及其相关的操作可被封装在一个对象中，它可以被重复使用和易于升级、增加和替代。因此它能直接降低维护费用和加快新系统的问世并提高其可扩充性。

面向对象技术有望提供组件级的软件对象，这种软件对象能快速组合起来，以构成能适应不断变化业务条件的新应用程序。由于对象是通过发送能由其他对象理解的消息而进行通信

的，因而较容易构成大型的集成系统。

多数面向对象的系统是混合系统，它们通过在最低的层次上采用传统的编程和在较高的层次上采用面向对象编程而减少了消息传递的开销。混合系统可以接近传统程序设计方法所能达到的机器效率。

对象可以看做是可重复使用的元素，一旦程序员开发了一个这类元素的库，他就能使所需要的新编码数量减至最小。用户向往商品化的对象库，程序员可以买到它，并可反复用于不同的应用程序中。但构造这样一个对象库不是一件简单的事情，因为原始软件设计的完整性要求是很高的。对用户来说可重复利用性的好坏也可能是一件难说的事，因为程序员必须能够找到所需的对象。但若提高生产率是你的目标，那么可重复利用性是值得去冒的风险。

2.3 操作系统

课文

操作系统是一种程序，它是用户与计算机硬件之间的接口。操作系统的目的就是提供一种用户能执行程序的环境。然而，一般来说，操作系统没有一个完整恰当的定义。操作系统的存在是因为它们是解决可用计算机系统问题的一种合理的方法。计算机系统的基本目标是执行用户程序和解决用户问题。计算机硬件是朝着这个目标而构建的。因为只有硬件的裸机不能使用，于是开发了应用程序。这些不同的程序要求某些共同的操作，如控制 I/O 设备。这些控制和分配资源的共同功能合并到一个软件中，就形成了操作系统。

最初的操作系统是由计算机制造商为计算机产品开发的。当制造商推出另一种计算机或型号时，他们往往会开发出经过改进的且不同于原来的操作系统。这就意味着如果用户希望更换计算机，无论是更换为另一个制造商生产的计算机，还是更换为同一个制造商生产的另外一种型号的计算机时，都必须把现有的程序更换为能在新的操作系统下运行的其他程序。而今天，仅限于某个型号的操作系统已经被淘汰，取而代之的是能运行于指定制造商生产的任何型号的操作系统。

研究操作系统最突出的理由如下。

- 用户为了完成自己的任务必须与操作系统打交道，因为操作系统是用户与计算机间的主要接口。
- 大多数计算机安装的主要决策是选择操作系统及其选项。
- 操作系统中所发现的许多概念和技巧一般可以应用到其他领域。
- 对某些特殊应用而言，人们可能不得不设计自己的操作系统，或者对现有的系统进行改进。

一个操作系统与一个政府类似。计算机系统的基本资源由硬件、软件与数据来提供。操作系统为计算机系统的操作提供正确使用这些资源的方法。像一个政府一样，操作系统本身执行不了任何有用的功能。它只不过是提供一个环境，在该环境中其他程序能发挥作用。

我们可以把操作系统看做一个资源分配器。计算机系统有很多的资源用来解决一个问题：CPU 的时间、存储空间、文件存储空间、输入/输出设备等。操作系统作为资源的管理者，为满足特定程序和用户的任务需要而分配资源。因为有许多资源请求方面可能存在冲突，操作系统必须决定给哪些请求分配资源以便计算机系统能合理而有效地运行。

把操作系统看做资源管理器，每一种管理器必须做如下工作：

- 记载资源情况；
- 实施某种策略决定谁获得什么，何时获得和获得多少；
- 分配资源；
- 收回资源。

操作系统的主要目标是方便用户。操作系统的存在是因为有操作系统比没有操作系统计算更容易。当观察一个小型个人计算机的操作系统时这点是特别清楚的。操作系统的第二个目标是使计算机系统的操作更有效。这个目标对于一些大型共享的多用户系统特别重要。这些系统通常都很昂贵，因此使它们尽可能有效地工作是符合人们愿望的。方便和有效这两个目标常常互相矛盾。以往，人们常常过多地考虑了有效性而忽略了方便性。因此许多操作系统理论都集中在计算机资源的优化使用方面。

操作系统有单任务和多任务之分。早期的许多单任务操作系统同一时间只能运行一个进程。例如，当计算机打印文件时，它就不能开始运行另一个进程，或者不能响应新的命令，直到打印完成为止。

所有现代操作系统都是多任务的，同时能运行几个进程。大部分计算机中仅有一个 CPU，所以，多任务操作系统让人产生 CPU 能同时运行几个进程的错觉。产生这种错觉的最常用机制是时间片多任务处理，以每个进程各自运行固定的一段时间的方式来实现的。如果一个进程在分派的时间内没有完成，它就被挂起，另一个进程接着运行。这种进程交换称为任务切换。操作系统实行“簿记”法以保存被挂起的进程状态。它同样有一种机制，叫做调度程序，由它决定下一时刻将运行哪个进程。为了把感觉到的延迟减到最小，调度程序运行短进程非常迅速。由于用户的时间感觉比计算机的处理速度要慢得多，所以几个进程看起来是同时执行的。

操作系统的一个非常重要的职责是调度计算机系统将要处理的作业，这是作业管理功能的主要任务之一。操作系统建立程序处理的顺序，并定义了具体作业执行的次序。术语“作业队列”常用于描述等待执行的作业序列，操作系统在排列作业队列时将权衡各方面因素，他包括当前正在处理哪些作业，正在使用哪些系统资源，需要哪些资源来处理后面的程序，与其任务相比该作业的优先级及系统应响应的一些特殊处理要求等。操作软件应能评估这些因素并控制处理的顺序。

系统资源的分配与操作系统对 I/O 操作的控制密切相关。由于 I/O 操作开始之前需要对指定设备进行访问，因此操作系统必须协调 I/O 操作和使用设备间的关系。为便于 I/O 操作的执行，大多数操作系统都有一个标准的控制指令集来处理所有输入和输出指令。这些标准指令称为输入/输出控制系统（IOCS），是大多数操作系统不可分割的部分。它们简化了被处理的程序承担的 I/O 操作。

早期的大多数操作系统是由一个大型程序组成的，当系统变得越来越大并且更复杂时，这种“强大”的管理方法就行不通了，后来，扩充机器方法从两个方面应用到操作系统上来：（1）把许多系统模块都需要的关键性功能分离出来放在“内层扩充机器”上；（2）某些模块可以划分出来，像用户进程一样运行在扩充后的机器上。

阅读材料

操作系统技术介绍

Windows XP

Windows XP 是 Microsoft 继 Windows 2000 和 Windows Millennium 之后推出的新一代 Windows 操作系统。Windows XP 将 Windows 2000 的众多优点（如基于标准的安全性、易管理性和可靠性）与 Windows 98 和 Windows Me 的最佳特性（即插即用、易于使用的用户界面以及独具创新的支持服务）完美集成在一起，从而打造出了迄今为止最为优秀的一款 Windows 操作系统产品。Windows XP 建立在增强的 Windows 2000 代码基础之上，并且针对家庭用户和企业用户的不同需要提供了相应的版本：Windows XP Home Edition 和 Windows XP Professional。在保留 Windows 2000 核心代码的同时，Windows XP 还对界面进行了全新的设计。新的用户界面对各种常见任务进行了合并和简化，新增加的视觉提示能够帮助你更容易地在计算机中找到所需资料。

Linux

Linux 是一个操作系统，担当计算机系统硬件与软件间的通信服务，Linux 内核包含了对任何操作系统期望的所有特性。Linux 提供功能强大和高级的系统管理设施，丰富的设备支持，在可靠性和鲁棒性以及广泛详尽的文档方面有极好的声誉。

与 Windows 不同，Linux 本来就是模块化的，并且能够很容易缩减成紧缩配置，这种配置几乎与 DOS 差不多，甚至能放到一张软盘上。此外，因为 Linux 源代码是免费开放的，所以可以按照独特的嵌入式系统要求改编该操作系统。开放源代码的 Linux 已建立了一个新的操作系统开发和支持范例，在那里数以千计的开发人员继续贡献于不断发展的 Linux 代码库。此外，几十家面向 Linux 的软件公司已经出现——它们热切支持那些为建立从工厂自动化到智能设备范围很广的应用系统的开发人员的需求。

对许多嵌入式系统，为了适应诸如 RAM、固态盘（SSD）、处理机速度以及功耗的约束，嵌入的 Linux 的主要任务是使系统所需的资源最小。嵌入式操作系统可能需要从一个芯片盘或紧凑闪存固态盘上自举；或者自举和运行在没有显示器和键盘的环境，或经由以太网连接，从远程设备装入应用程序。现成的小 Linux 有许多来源，其中有日益增多的面向应用的 Linux 配置和分发版，这些都被修改成适用于特定的应用。例如，路由器、防火墙、互联网/网络设备、网络服务器、网关等。

虽然 Linux 不是一个实时操作系统，但当前有几个扩充选项可用，这些选项把实时能力带给基于 Linux 的系统，最通常的方法是双内核方法。就这种 Linux 来说，能保持与标准 Linux 兼容，而以非干扰的方式增加了实时功能。

Windows Vista

Windows Vista 是微软的最新一代操作系统。作为微软的最新操作系统，Vista 第一次引入了“Life Immersion”概念，即在系统中集成许多人性的因素，一切以人为本，使得操作系统尽最大可能地贴近用户，了解用户的感受，从而方便用户。

Windows Vista 的最低系统要求较高，但还是比较合适的。它的最低系统要求包括 800MHz

的处理器、512MB 的 RAM 和一个 20GB 的硬盘。符合这些标准的计算机系统能运行 Windows Vista，并能达到 Windows Vista 所能达到的运行性能。

微软保证 Windows Vista 将给你的世界带来透明度，因此你能更加确实地和安心地依靠你的个人计算机。在个人计算机上装载了 Windows Vista 后，你完全能利用动态音频—视频输出、音乐和电视来得到更加生动的多媒体体验。

就安全问题而言，Windows 系列的老版本有很多安全问题。黑客用离你的系统几千英里之外的电脑侵略你的系统，得到他们所需要的数据，这些数据可以是存储在你电脑里的个人信息、银行账户细节等信息。Windows Vista 的默认浏览器 Internet Explorer 被升级到了 7.0 版本。它包含了许多安全特征，如保护模式浏览、反钓鱼式欺骗软件、向外和入站防火墙、标准用户账号功能、用户账号控制、窗口防御和父母控制等。

Windows Vista 提供了新的令人惊异的图像功能。凭借 Windows Vista，微软在图像方面已超过了 Mac OS（它是苹果公司开发的 Macintosh 操作系统）。这也是微软第一次提供了大量高质量的包含 3D 效果的图像。这将有助于一些 3D 游戏软件的推广。

在无线网络功能方面，我们可以看到在 Windows Vista 的最终版本里有非常多的变化。在 Windows Vista 中，我们可以保存无线网络连接的设置并可为它起名。我们可以调用这些设置进行网络再连接。

2.4 编译原理

课文

编译程序是指将用高级语言书写的文本转换成等价的用低级的汇编语言或机器语言书写的文本。我们将大多数现存的编译程序分解成七个公用部分，观察它们之间的关系。这七部分内容如下：

- 扫描器。
- 语法分析器。
- 中间代码生成。
- 语义处理程序。
- 优化器。
- 代码生成。
- 表格。

不是所有的编译程序都具有这七个由彼此独立的实体构成的模块，例如，扫描程序可以合并到语法分析程序中去，或者语义处理程序可以合并到语法分析程序中去，等等。但是，从概念上看，把任一编译程序分解成这七个部分是较容易的。

扫描程序在有些书中称为词法分析程序，当一个程序首次输入到编译程序中时，它只是一个长符号流，也许分析成与输入介质有关系的行或记录。扫描程序是把源程序这种外部形式转换成更适用于编译程序其他部分操作的内部形式。

扫描程序的作用如下：

- 指出程序中的基本词法单元，称为标记；
- 删除无关的空格、回车符及其他与输入介质有关的符号；

- 删除注释行；
- 报告扫描器发现的错误。

典型的扫描程序对原始形式的文本进行一次扫描，完成四个任务，然后用内部格式，以一次一个标记或是以一个大的标记文件形式输出给语法分析程序。扫描程序通常是逐个字符地审查文本。

扫描程序根据它当前审查的符号，以及它前面已经了解的文本的知识做出判定：当前处理的这一符号是否是注释部分，是否是不必要的空格，是否是一个新的标记的开始，是否是原标记的继续，还是某个非法出现的符号？然后，扫描程序采取与之必须产生的输出相符的合适行动。在词法这一级，程序中的词是由标识符、关键字、数值和界符组成。

每种程序设计语言都有自己的语法规则集，用于说明本语言编制程序的正确形式。分析器或语法分析程序接收扫描器的输出，即标记和证实所编译的源程序满足本语言的语法规则。在英语中，通常并不是很精确地叙述它的语法规则。然而，每种程序设计语言的语法足够简单，以至可以用精确的数学符号表示法——上下文无关文法写出，使用这种方法可以机械地确定程序是否属于所研究的语言。

由语法分析器输出的语法树被转换成用中间代码所写的某种形式的“程序”，这种形式与源文本相比更接近于汇编语言，它比汇编（机器）代码更便于被编译程序以后处理。由于中间级代码在特性上类似于机器代码，但在形式上不同，它通常随着产生目标代码的机器的不同而不同。例如，一台具有栈结构（如 B5500）的计算机的编译程序所产生的中间代码将不同于常规的冯·诺依曼结构的计算机所产生的中间代码。

代码生成器直接把中间代码转换成目标语言。然而，通常在语义处理器和代码生成器之间插入一个成分，即优化程序（代码优化）。如果中间代码直接由代码生成器转换成汇编代码，则程序在执行时间和存储空间方面的效率往往不高。如果一个编译器要产生高效的代码，正如大多数商业编译器那样，它必须包含一个特定设计的模块以综合改进代码的时间和空间特性。优化程序将原代码改为更有效的形式。

我们把优化技术分成两类：第一类是在源程序（它的内部形式）上完成的优化，因此它们是不依赖于目标语言的，而另一类是在目标程序级上完成的优化。

一方面，代码生成器是将优化器产生的中间代码转换为汇编或机器语言代码（目标程序）的装置；显然，代码生成是高度依赖于机器的。因此，无论何时当目标机改变时，则代码生成器也必须随之改变。另一方面，其他部分对产生代码的机器的改变是不敏感的。然而，通常没有这样的编译器的模块，可以在目标机器改变时，一点也不改变。

一个编译程序应将源程序中的错误尽可能多地查找出来。下面是三个错误处理阶段：

- 检查。
- 报告。
- 校正。

错误处理的第一个阶段是查错，根据查错时间，可将错误分为两大类：适于编译时查出的错误和适于执行时查出的错误。为了查找编译时的错误，每个编译的主要成分都可以查出不同类型的错误。首先，扫描器可以查出词法错误；然后，语法分析器能够查出所有的语法错误；最后，在语义处理程序中，能够调用动作例行程序查出许多语义错误。运行时错误的检测可以通过执行环境或通过由编译程序把代码插入到目标程序中完成某些检查来实现。

错误处理的第二个阶段是报告错误。一旦查出一个错误，它必须向用户和负责处理错误的

代理人报告，报告的错误信息应该写得清楚，用无二义性的英语句子，不要用难懂的或缩写的格式。它们应该对错误精确定位和指出错误的本质，有可能的话，还需指出程序员如何修改这种错误。信息还应该指出采取的校正动作。

错误处理的最后一个阶段是当报告了一个错误之后，应采取的动作。从企图修改一个错误程序到终止编译程序或目标代码的执行有几种校正策略，最好的校正策略是随着错误的性质和严重程度而变化，也和编译程序作者的判断有一定的关系。

阅读材料

编译器的设计

过去，为了节省空间，编译器被分成很多遍。在这里，“遍”是编译器编译源代码并由此建立编译器内部数据的整个过程的一次运行。当每遍结束时，编译器能释放该遍的内部数据空间。这种“多遍”技术是当时很常用的编译技术，但也应给与主机相对于源代码和数据大小的必要的主存空间。

很多最新的编译器都采用了“双端”设计技术。前端把源代码翻译成中间语言。第二个阶段是后端，它把中间语言经过处理形成输出语言代码。前端和后端应该用不同的遍来执行，或者前端调用后端作为子程序，并把中间语言传递给后端。

这种把处理语义、出错检测等前端工作和主要产生正确有效输出的后端工作分离开来的方法降低了复杂性。它也同样有允许多语源使用单一后端的优点，以及允许对于不同对象使用不同后端的优点。

通常，如果前端和后端都能够对由前端送达后端的中间语言进行操作的话，那它们就可以共同处理代码的最优化和出错检测。这样可以让很多编译器（前后端的联合）重用大量经常性的代码分析和最优化工作。

编译器前端本身是由多个阶段组成的，每个都含有丰富的形式语言理论。

（1）词法分析——把源代码分成很多小块（符号或终结符），每个都代表一个单一的语言单位，如一个关键词，标识符或者符号名。这种符号语言是典型的正规语言，因此一个由规则表达式组建的有限状态自动机能识别它。这个阶段也叫做罗列或者扫描。

（2）语法分析——确定源代码的语法结构。它只注重结构，换句话说，它定义了代码中符号的顺序并推出代码层次结构。这个阶段也叫做分析。

（3）语义分析——将识别出程序代码的含义并开始做好输出的准备。在这个阶段，进行了类型校验并指出了大多数的编译错误。

（4）中间语言的产生——一个与源程序等价的中间语言程序被创建。

当应用程序只需要编译器前端时，如静态语言测试工具，一个真正的编译器把由前端产生的中间语言传递给后端，后端再产生一个功能等价的用输出语言编写的程序。这是多步实现的。

（1）编译分析——这是把用由输入源文件产生的中间语言编写的程序信息收集起来的过程。典型的分析有可变的定义—使用及使用—定义链、数据关系分析、别名分析等。精确分析是编译最优化的基础。调用图和控制流程图在分析阶段中也经常使用。

（2）优化——中间语言形式被转变成功能一样但执行较快（或者所占空间较小）的形式。普遍的优化是嵌入式扩展、消除无用代码、常量传播、循环转换、寄存器分配或者甚至是自动并行。

（3）代码生成——优化转变过的中间语言被翻译成输出语言，通常是本地系统的机器语言。这包括资源和存储空间的确定，比如确定哪些变量适合于在寄存器和主存中，以及选择和定制与其寻址模式适合的机器指令。

2.5 数据库技术

课文

数据库管理系统（DBMS）由一个互相关联的数据的集合和一组用以访问这些数据的程序组成，这个数据集合通常称做数据库，其中包含了关于某个企业的信息。DBMS 的基本目标是要提供一个可以方便地、有效地检索和存储数据库信息的环境。

设计数据库系统的目的是为了管理大量信息。对数据的管理既包含信息存储结构的定义，又涉及信息操作机制的提供。另外，数据库系统还必须提供所存储信息的安全性保证，即使在系统崩溃或有人企图越权访问时也应保障信息的安全性。如果数据被多用户共享，那么系统还必须设法避免可能产生的异常结果。对大多数组织而言，信息都非常重要，这决定了数据库的价值，并使得大量用于有效数据管理的概念和技术得到发展。

数据库系统所使用的存储结构和访问方式通过一系列特殊的 DDL 语句来定义，这种特殊的 DDL 语句称做数据存储定义语言。这些语句的编译结果是一系列用来描述数据库模式实现细节的指令，这些实现细节对用户来说通常是不可见的。数据库模式也是通过 DDL 说明的。DDL 语句的编译结果是存储在一个特殊文件中的一系列表，称做数据字典或数据目录。数据字典是一个包含元数据的文件，元数据是关于数据的数据。在数据库系统中，实际数据读取和修改前总要先查询该文件。

事务管理

事务是数据库应用中完成单一逻辑功能的操作集合。每个事务是一个既具原子性又具一致性的单元。因此，我们要求事务不违反任何的数据库一致性约束，也就是说，如果事务启动时数据库是一致的，当这个事务成功完成时数据库也应该是一致的。但是，在事务执行过程中，必要时允许暂时的不一致。这种暂时的不一致尽管是必需的，但在故障发生时，很可能导致问题的产生。

正确定义不同事务是程序员的任务，事务的定义应使之能保持数据库的一致性。例如，资金从账户 A 转到账户 B 可以定义成由两个单独的程序组成：一个对账户 A 执行借出操作，另一个对账户 B 执行贷入操作。这两个程序的依次执行可以保持一致性，但是，这两个程序本身都不能把数据库从一个一致状态转入另一个新的一致状态，因此它们都不是事务。

原子性和持久性的保证则是数据库系统自身的任务，更确切一些，是事务管理器的任务。在没有故障发生的情况下，所有事务均成功完成，这时要保证原子性很容易。但是，由于各种各样的故障，事务并不总能成功执行完毕。为了保证原子性，失败的事务必须对数据库状态不产生任何影响，因此，数据库必须能恢复到该失败事务开始执行以前的状态。数据库系统应该能检测到系统故障并将数据库恢复到故障发生以前的状态。

存储管理

数据库常常需要大量存储空间。公司数据库的大小是用吉字节（GB）来计算的，最大的

甚至需要用太字节（TB）来计算。一个吉字节等于 1 024 个兆字节（2^{20} 字节），1 个太字节约等于 100 万个兆字节（2^{30} 字节）。由于计算机主存不可能存储这么多信息，因而信息被存储在磁盘上，需要时信息在主存和磁盘间移动。由于同中央处理器的速度相比数据出入磁盘的速度很慢，数据库系统对数据的组织必须满足使磁盘和主存间数据移动的需求最小化。

数据库系统的目标是要简化和辅助数据访问，高层视图有助于实现这样的目标。系统用户可以不受系统实现的物理细节所带来的不必要的负担所累。但是，决定用户对数据库系统满意与否的一个主要因素是系统的性能。如果一个请求的响应速度太慢，系统的价值就会下降。系统性能决定于用来表示数据库中数据的数据结构的高效性，以及系统对这样的数据结构进行操作的高效性。正如计算机系统中其他方面也会出现一样，不仅要在时间与空间两者间进行权衡，还要在不同操作的效率间进行权衡。

存储管理器是在数据库中存储的低层数据与应用程序及向系统提交的查询之间提供接口的程序模块。存储管理器应负责与文件管理器的交互。原始数据通过文件系统存储在磁盘上，文件系统通常由传统的操作系统所提供。存储管理器将不同的 DML 语句翻译成低层文件系统命令，因此，存储管理器负责数据库中数据的存储、检索和更新。

数据库管理员

使用 DBMS 的一个主要原因是可以对数据和访问这些数据的程序进行集中控制。对系统进行集中控制的人称做数据库管理员（DBA）。DBA 的作用包括：

- 模式定义。DBA 通过书写一系列的定义来创建最初的数据库模式，这些定义被 DDL 编译器翻译成永久地存储在数据字典中的表集合。
- 存储结构及存取方式定义。DBA 通过书写一系列的定义来创建适当的存储结构和存取方式，这些定义由数据存储和数据定义语言编译器来翻译。
- 模式及物理组织的修改。程序设计人员偶尔也会对数据库模式或物理存储组织的描述进行修改，这是通过书写一系列的定义来实现的，DDL 编译器或数据存储和数据定义语言编译器使用这些定义，对适当的内部系统表（如数据字典）产生修改。
- 数据访问授权。通过授予不同的权限，允许数据库管理员信息保存在一个特殊的系统结构中，一旦系统中有访问数据的要求，数据库系统就会去查阅这些信息。
- 完整性约束的定义。数据库中所存储的数据的值必须满足一定的一致性约束。完整性约束保存在一个特殊的系统结构中，一旦系统中发生更新，数据库系统就去查阅这些约束。

阅读材料

通用数据访问

通用数据访问（UDA）是微软公司的一种用来提供对企业内部信息访问的策略。今天，正在建立数据库应用软件的一些公司，当它们试图从遍及它们公司的数据与信息获取最大商业利益时面临着一些挑战。通用数据访问提供了对各种各样信息源（包括关系型和非关系型）的高性能访问，以及容易使用的与工具和语言无关的程序设计接口。这些技术使公司能集成各种各样的数据源、创建易于维护的应用软件，并且使用它们选择最合适的工具、应用程序及平台服务。

微软数据访问组件（MADC）提供了对一切类型的企业内部数据的易于使用且高性能的访问。创建客户/服务器和基于互联网/内部网的数据驱动的应用软件的开发人员，使用这些组件很容易集成来自各种关系型和非关系型数据源的信息。

ActiveX 数据对象（ADO）程序模型代表现有微软数据访问程序模型中最优秀的。不管是在使用某个应用程序、工具、语言，甚至互联网浏览器去创建前端数据库客户机，还是中间层业务对象，ADO 都提供对数据的一致而高性能的访问。对于 1~*n* 层客户/服务器和基于 Web 的数据驱动的应用软件的开发来说，ADO 是需要了解的唯一的数据接口。如果熟悉数据访问对象（DAO）或远程数据对象（RDO），你将认识这些接口并且将能迅速地使用它们。ADO 对象提供了访问所有种类数据源最快捷、最容易和最丰富的手段。

开放数据库互连（ODBC）是一个广为接受的用于数据库访问的应用程序设计接口（API）。它基于 X/Open 和 ISO/IEC 的调用级接口（CLI）规格说明作为数据库的应用程序接口，并且使用结构式查询语言（SQL）作为其数据库访问语言。

ODBC 是为了最大的可互操作性而设计的，也即有单个应用程序能以相同的源代码访问各个不同的数据库管理系统的能力。数据库应用程序调用 ODBC 接口中的一些函数，这些函数都是在一些称为驱动程序的数据库专用的模块中实现的。驱动程序的使用把应用程序同数据库专用的调用隔离开来，其方式与打印机驱动程序把字处理程序同打印机专用命令隔离开来的方式相同。因为驱动程序是在运行时刻装入的，用户只需添加访问新 DBMS 的驱动程序，不必要对应用程序重新编译或重新链接。

DAO 提供了使用代码来创建和操纵数据库的框架。DAO 提供一组层次结构的对象，它们使用微软 Jet 数据库引擎来访问下列数据和数据库结构：

- 微软 Jet（.MDB）数据库；
- 使用 ODBC 驱动程序的 ODBC 数据源；
- 可安装的 ISAM 数据库，诸如 dBASE、Paradox 和微软的 Foxpro，它们都是数据库引擎能直接识读的。

RDO 提供了通过 ODBC 访问远程数据源的信息模型。RDO 提供一组对象，使得易于连接到数据库、执行查询和存储过程、处理结果和向服务器提交变更。它专门设计来访问远程 ODBC 关系型数据源，且使得没有复杂的应用程序代码就能容易地使用 ODBC，因此是访问使用 ODBC 驱动程序连接的关系型数据库的主要手段。RDO 实现了在开放数据库互连 API 和驱动管理器之上的一个薄薄的代码层，它使用最小工作站资源建立连接、创建结果集和游标，以及执行一些复杂的过程。

第 3 单元　多媒体及其应用

3.1　多媒体

课文

顾名思义，多媒体是一组多于一个媒体元素的集合，用于进行具体的、更有形的交流方式。换句话说，多媒体同时使用不同来源的数据。多媒体的这些来源被称为媒体元素。随着信息技术的快速增长和日新月异的变化，多媒体已成为计算机世界的一个重要组成部分。其重要性体

现在几乎所有生活中，可能的应用领域是教育、电影、广告、时装等。

20 世纪的 60～80 年代，计算机仅限于处理两大类型的数据——字符和数字。但随着技术的发展，计算机还能够处理图像、音频、动画和视频。

多媒体元素

如果我们将 multimedia 这个词分开，便得到 multi（意为多于 1 个）和 media（意为通信）的形式。媒体类型包括文本、声音、静态图像、动画和动态视频。基于硬件的能力，要权衡选择静态图像、声音、全运动影像和文本，可以推测，文本信息占用存储空间最小。

1．文本

无论是否用过计算机，大多数人都熟悉文本，它是字处理程序的基础，并且仍作为许多多媒体程序中的基本信息。

实际上，许多多媒体应用程序是基于由书本到计算机形式的转换的，这种转换使用户能直接访问文本，并为其显示一个弹出式窗口，以给出特定词的定义。多媒体应用程序也使用户能够立刻显示与正在浏览的某个主题有关的信息。功能更强的是，一本计算机化的书允许用户快速查找信息（而不必根据索引或目录）。

Windows 操作环境为用户表示文本提供了无限的能力。一个多媒体程序员可以选择要显示文本的字体、字号大小以及颜色。通过以多种形式显示文本，使人们更易理解多媒体应用程序要表达的信息。

Windows 帮助模块是许多人天天用到的多媒体应用程序。这是一种基于文本的查询界面，可方便地访问某一主题的相关信息。

2．声音

把声音融入多媒体程序，用户可以得到使用其他通信方式无法得到的信息。某些类型的信息不用声音很难有效表达，如用文字准确描述心脏的跳动声以及大海的声音几乎是不可能的。声音也可以加深用户对其他媒体表示的信息的理解，如可以把看到的动画片讲述出来。它可以帮助人们理解应用程序，从而更好地理解多媒体。学习研究专家已经发现用多种感官表达的信息对信息的后期记忆很有帮助。最重要的是，多媒体信息可以引起用户的更大兴趣。

声音有几种不同格式。今天，也许最普遍的声音类型是声音红皮书，这是为 CD 消费者提供的标准，它作为一种国际标准并正式公布为 IEC908。之所以被称做红皮书，是由于描述这种格式的书的封面是红色的。声音红皮书也被用于多媒体程序，它是获得高质量声音的基础。

另一种声音格式是 Windows 声波文件，它只能用于 Windows 环境下的 PC。声波文件包含用于回放声音的实际数字数据和文件头，文件头提供有关分辨率及回放速度的附加信息。声波文件可以存储通过麦克风录入的所有声音。

最后一种声音格式称为乐器数字接口，缩写为 MIDI。MIDI 格式实际上是由乐器制造商制订的，MIDI 实际并非数字化的声音，而是描述要演奏的音符的信息集合。MIDI 不能存储除音符之外的任何东西。MIDI 音乐可以由定序器生成。

3．静态图像

当你想象图像时，你可能想到静态的图像——也就是像照片或画一样，这种类型的图像是不动的。静态图像是多媒体的重要部分，因为人类是视觉定位的。Windows 也是可视化环境，它比基于 DOS 的环境更容易显示图像。

静态图像有多种格式，也可以用许多不同的方式生成。就像你可以看到无数的图像和照片

一样，多媒体应用程序中包括的静态图像格式几乎也是无限的。

4．动画

动画就是运动的图像，给出运动的 CPR 比只给一幅静态图像可使人更容易明白心肺复苏运动。动画和静态图像一样，都是强有力的通信形式，动画在解释涉及运动的概念中特别有用。讲解如何弹吉他或打高尔夫球，只用一幅图是不行的，甚至一系列的图也不行，用文字解释就更困难了，而多媒体应用程序中用动画解释它则轻而易举。

5．全运动影像

全运动影像，如电视里的图像，可使多媒体的应用更为广泛。虽然全运动影像听起来像是一个往多媒体程序中加入强有力信息的理想方法，但它无法达到人们看电视一样的效果。PC 上的全运动影像仍处于初始阶段，其大小和分辨率仍受限制。即使用高性能的数据压缩算法，全运动影像的数据也可以极快地占满硬盘空间。

多媒体的应用

更快的计算机和迅速发展的多媒体计算机程序将可能永远改变人们获取信息的方法。通过使用多媒体，我们能更清晰地了解信息。很多事物，如电子游戏、电影、游戏及歌曲使得多媒体成为计算机世界中最令人激动及富有创造性的领域之一。

电子游戏——迄今为止交互式多媒体的最广泛的应用领域是电子游戏。几乎每个游戏都是高度的交互性多媒体的应用，表现为具有同步声音和音乐效果的 3D 动画形式。

超媒体浏览器——超媒体是链接各媒体元素以组织多媒体信息的一种方式。那些被链接的元素称为节点，整个组合被称为超媒体网。当两个节点间存在着链接关系时，那它们应该有着某种形式的关联。例如，一个数字图像可链接到图像的文本描述。

多媒体演示系统——它提供交互式的演示，同步地处理多媒体信息。例如，用来编译和显示电子“幻灯片”的演示软件及多媒体文档浏览器。

桌面会议系统——配备麦克风、扬声器、视频摄像机于接入多媒体网络中的台式计算机能和其他有同样设备的计算机建立起声频和视频连接。这是桌面会议的基础，这里计算机起着多媒体通信设备的作用。与会者能同时编辑共享对象并看到相互间的修改。

多媒体服务——许多多媒体应用都可放在“多媒体服务”这个大的标题之下。多媒体服务包括交互式购物、银行、教育及医疗服务，在这些领域，多媒体极大地丰富了界面，还有视频点播，用户通过它可在家中远程回放存储好的数字电视节目。

阅读材料

三维存储的下一步发展

随着商界和消费者对数据存储的需求爆炸，光存储技术的开发者们正在争着将越来越多的字节装进更小的空间。在人们期待已久的全息术成为存储介质的希望被实现之前，荧光多层盘（FMD）有可能脱颖而出。

纽约的星座 3D 公司（C3D）提出一种利用红色激光和荧光染料的方法，将可以涂覆在盘片两面的信息层的数目增加到 10 层，同时其密度和传输速度与 DVD 相当。今后，每个盘片可能多达 100 层。

CD-ROM 只用一层信息层，它反射红外激光以提供单面盘 650MB 的存储容量。DVD 利

用红外激光，在每面有两层存储的双面盘上提供 9GB 的存储容量。

在 FMD 技术中，荧光染料代替了在 CD-ROM 和 DVD 中存储信息的反射、半反射的涂层。由于激光在更深入介质时不会被阻断，所以就允许有更多的信息层。

同时，信号返回时噪声和干扰也更少。这是因为当聚焦的激光击中其中一个信息层上的凹点时发射出的荧光具有与激光不同的波长。发射出的荧光携带信息，而反射的激光在读出装置中被过滤掉。

飞利浦公司和 IBM 公司都已提出多层反射光盘的概念。然而，探测激光的反射相干光引起干扰和在不同的信息等级之间产生串音，使发射信号急剧变坏。

据 C3D 公司介绍，单个 FMD 的成本可能比其他的存储介质要高些，但每 GB 的成本应低得多。现在开发中的 FMD 将保存 140GB 的数据，相比而言，下一代 DVD 预测的存储容量为 20GB。

C3D 公司希望 FMD 技术成为各种各样小型便携式器材和电子设备的标准。FMD 将允许在信用卡大小的盘片上存储 GB。C3D 公司希望此技术在今后 5 年内使数据存储发生革命性的变化。它将代替 CD 和 DVD 技术，用于移动电话、手持计算机、录像机、PC、数码相机和高清晰度电视机。

然而，有些工业界的分析师认为，对增强数据存储感兴趣的用户不应计划很快丢掉 CD-ROM 和 DVD。其他一些加速存储技术进步的研究工作已经做了很多允诺，有些已经很多年了，但已做成的几乎没有。

其中一项还在实验室中研究的技术是蓝色激光。利用比红色激光更短的波长，从而拥有更大的存储容量，蓝色激光能烧出更小的凹点，塞入更多的可移动数据。在 20 世纪 90 年代中期有些行业杂志预测，到 2000 年蓝色激光将进入商业开发。甚至像索尼、3M、飞利浦和松下等公司也参加研究和开发，但蓝色激光装置对商业应用仍然不实用。

全息照相术的前身不是旋转的盘片，而是照相术和全息术。全息术的诱人之处是在像一块方糖大小和形状的晶体内存储 1TB 的数据密度。记录材料为光敏晶体，被一束参考光和一束信号光照射，得到的干扰图记录在晶体内。将参考光照射干扰图，返回初始的信号光束，整页的数据能同时被恢复和读出。数据的地址就是参考光束的角度和频率。

3.2 计算机图形和图像

课文

计算机图形学是计算机领域一个了不起的发明。它应用于不同领域，如演示工程和科学计算及可视化的结果，制作电视广告和特色电影，现实世界问题的模拟和分析，计算机辅助设计，增加人机间通信带宽的图形用户接口等。用计算机作图的技术已得到广泛应用，这对于探索计算机图形的本质是非常重要的。

图形的图元

图元是创造和组成复杂图像的基本图形对象。幸好图形是由三个基本图元组建而不像图形的应用那样纷繁复杂。三个基本组件中最根本的是像素，最小的图形元素。

一个像素是一个亮点。在光栅扫描显示器上只是一个微小的点。尽管它没有结构，但它被定义为建筑块，因此被认为是图形图元。CRT 的分辨率与点的尺寸（即单个点的直径）有关。

每英寸 100 点对应的分辨率含义是一个点尺寸是 0.01 英寸。然而，实际上，像素是椭圆形而非圆形。像素的形状仅取决于视觉显示单元的特性。两个相邻水平像素中心的距离与两个相邻垂直像素中心的距离之比叫做像素比。

线，特别是直线，组成了计算机图像的重要建筑块。例如，线是用于线形图、条形图和饼图，数学函数的二维、三维图像，工程制图和建筑规划的基本建筑块。在计算机图形中，直线在创造图形时是很基本的，以至于我们称它为图形图元。直线有两个不同的用途。结构方法是在画线之前决定像素的位置，条件方法是先验证一定的条件从而再决定像素的位置。

多边形，尽管通常由直线组成，但它也是重要的图形元素。由于现实世界的大量的物体图示都是由多边形组成的，因此我们经常要将多边形作为一个独立的整体来对待。多边形是由直线或曲线围成的并用一种固定的颜色填充的封闭区域。因为图像是二维的，所以多边形是一个平面的图形。

将多边形作为图形元素是很自然的并且十分有益的。我们可以把多边形定义为由一组有限有序的直线（即边界）组成的图形。同样地，多边形还可定义为一系列有序的顶点，即多边形的角。按一定的顺序横截顶点可以得到多边形的边。边界列表足够画出线框。两个相邻顶点定义一条边界。把最后一个顶点和第一个顶点相连就画出了这个多边形。

输出图元

通常，图形编程软件包提供了一些功能来描述场景，这些功能使用了称为输出图元的基本几何结构并将输出图元组合成更复杂的结构。每个输出图元是由输入的坐标数据和有关物体显示的一些信息来指定的。点和直线是图的是最简单的几何成分，其他可以用来构造图形的输出图元有：圆形及其他圆锥曲线、二次曲面、样条曲线和曲面、多边形填色区域以及字符串等。

通过将应用程序提供的单个坐标位置转换成输出设备的相应操作，可以进行点的绘制。例如，对于 CRT 监视器，则是打开电子束，从而在选中的位置上照亮屏幕的荧光层。电子束的定位方法取决于显示技术。

通过计算沿线路径上两指定端点间的中心位置，可以绘制一条线段，输出设备则按指令在端点间的这些位置直接填充。对于笔式绘图仪或随机扫描显示器这类模拟设备，可以从一个端点到另一个端点绘制光滑线段。这是根据 x 方向和 y 方向需要修改的实际量，线性地改变水平和垂直偏转电压而实现的。

数字设备通过绘制两端点间的离散点来显示线段。线路路径上离散的坐标位置是通过直线方程计算出来的。对于光栅视频显示器，线段的颜色（亮度）装入对应于像素位置的帧缓冲器中。视频控制器从帧缓冲器中读入该亮度值，然后显示在屏幕的像素上。一般使用整数值表示屏幕位置。这样将坐标值取整使得显示的线段具有阶梯现象（锯齿形）。光栅线的这种特有的阶梯现象在低分辨率的系统上特别明显，我们可以通过使用高分辨率显示系统来改善这一点。更有效的平滑光栅线的技术，则是基于对沿线路径上像素强度的调整。

为了将对应于扫描线行 y、列 x 的位置上指定的颜色装入帧缓冲器，我们假设有如下形式的低层函数：SetPixel (x, y)

有时，我们也要求能提取某个特定位置的当前帧缓冲器的强度设置，可以使用下列低层函数来完成：GetPixel (x, y)

数字图像

数字图像处理这个术语通常指的是利用数字计算机处理二维画面。从宏观角度上，它概括了任何二维数据的数字处理。一个数字图像是以有限的二进制位数表示的实数或复数数组。以投影胶片、幻灯片、照片或绘图方式给定的图像首先要进行数字化，再以二进制数字阵列形式存储在计算机存储器内。然后，再对这个数字化的图像进行处理，并（或）将其显示在具有高分辨率的电视显示器上。

为便于显示，图像被存储在快速存取的缓冲存储器内，该存储器以 30 帧/秒的速率刷新显示器，以形成视觉上连续的显示。小型或微型计算机可通过联网方式（例如以太网）通信，控制所有的数字化、存储、处理和显示操作。利用终端可以把程序输入到计算机内，在终端、电视监视器、打印机或绘图仪上输出信息也是很方便的。

数字图像处理的应用范围较广，如与人造卫星和其他宇宙飞船有关的遥感技术，用于商业上的图像传输和存储，医疗诊断，雷达、声呐，声像处理，机器人和工业零件的自动检测。

通过卫星获取的图像可用来跟踪地球资源；地理测绘；农作物生长；城市发展和气象的预测；防洪、防火以及其他环境下的应用。空间图像应用包括对在外层空间探测飞行中所获取图像中的物体进行识别与分析。图像传送和存储的应用体现于广播电视、电话会议、办公室自动化的图像传真（打印的文件和图形）、计算机网络通信、基于安全性监视系统的闭路电视以及军事通信之中。雷达和声呐图像被用来侦测和识别各类目标，或用于飞行器及导弹系统的制导与操纵。还有很多其他方面的应用，其范围从工业自动化中的机器人视觉到卡通制作或时装设计的图像合成。换句话说，每当人、机器或任何其他系统接收到二维或二维以上的数据信息，都要进行图像处理。

阅读材料

图像文件格式

图像文件格式提供了组织和存储图像数据的标准方法。图像文件是由像素或矢量数据组成的。图像压缩是使用算法来减少文件大小的方法。有很多图像文件格式，例如，JPEG、PGF、TIFF、GIF 和 BMP。

JPEG（联合图像专家组）标准是由 ITU、ISO 及其他标准组织的图像专家一起开发完成的。几乎所有的数字照相机都可以以 JPEG 的格式存储图像。重复的编辑和保存可以使 JPEG 文件逐步缩损。如果图像文件将来要重新编辑，或者由于 JPEG 压缩算法的本质而存在小“人为痕迹”是不可接受的，那么最好将图像保存为无损的非 JPEG 格式。在很多 Adobe PDF 文件中都使用 JPEG 压缩算法。

PGF（改进的图像文件）是最新引进的基于小波的位图图像格式。PGF 用于提高和替代 JPEG 格式。它是与 JPEG 2000 同时开发出来的。

TIFF（标签图像文件格式）是用于存储图像，包括照片和艺术线条的文件格式。TIFF 是用于高色调图像的一种流行格式，类似 JPEG 及 PNG。它是一种灵活的、可修改的文件格式。它能通过文件标题中标签内的内容来处理单个文件中的多重图像和数据。

GIF（可交换的图像文件格式）限于 8 位调色板或者 256 色。它非常适用于更简单的图像，如图形或固定的颜色区域。GIF 格式支持动画，并且普遍适用于提供图像动画效果。

BMP（位图文件）格式用于微软的 Windows 操作系统内部的图形图像处理。BMP 文件的主要优点是它们的普遍适用性、简易性，以及用于 Windows 程序。BMP 图像适用于背景图像和墙纸。

MPEG（运动图像专家组）标准是用于压缩视频的主要算法，已于 1993 年成为国际标准。它是用于数字压缩格式编码视听信息（如电影、视频和音乐）的标准的名称。MPEG 与其他视频、音频编码格式相比，其主要优势在于 MPEG 文件更小。主要的 MPEG 标准包括以下内容。

MPEG-1：它的目标是以 1.2 Mbps 的比特率产生视频录制质量的输出。它能在适当的距离上通过双绞线进行数据传输，并且可以以 CD-I 及 CD-Video 格式将电影存储在光盘存储器上。

MPEG-2：它最初是为了将广播性质的视频压缩到 4~6Mbps 而设计的，因此它能装配于 NTSC 或者 PAL 广播频道。它是用于移动图像及相关音频信息的普通编码的标准。MPEG-2 是 MPEG-1 的扩展集，具有附加的特性、帧格式及编码选项。

MPEG-3：它支持更高的分辨率，包括 HDTV。

MPEG-4：它是由 MPEG 开发的 ISO/IEC 标准，该组织也开发了获得艾美奖的标准，即我们所知的 MPEG-1 和 MPEG-2。MPEG-4 具有低的帧速率及低带宽，用于媒体解决方案的视频会议。MPEG-4 文件比 JPEG 或 QuickTime 文件要小，因此它们被设计成能通过更窄的带宽传输视频和图像，并且能够将视频和文本、图形和 2D 及 3D 动画层混合在一起。

MPEG-7：它是一种用于固定和移动网络的多媒体标准，允许综合多种范例。MPEG-7 通常被称为多媒体内容描述接口。它提供了一种完整地描述多媒体内容的工具设置，被设计成用于普通而非特殊的应用。

MPEG-21：MPEG-21 描述了一种标准，而不像其他的 MPEG 标准那样是用来描述压缩编码方式的，它定义了内容的描述以及访问、查询、存储和保护内容版权的处理。

3.3 计算机辅助设计

课文

在广义上，计算机辅助设计（CAD）指的是计算机在解决设计问题中的应用。工程技术人员可以借助于可视化显示屏、键盘、绘图仪和更多的人机接口与计算机通信。工程技术人员可以提出问题并能很快从计算机得到解答。更确切地说，CAD 是使工程技术人员和计算机协同工作，彼此发挥长处的技术。

过去，工程技术人员设计时所使用的传统工具是制图板、制图仪、计算器和技术数据图纸。后来，计算机的出现导致了工业中的巨大变化。随着数字控制、计算机数字控制、机床的相继引入，计算机在制造业中的应用在 20 世纪 50 年代末期首次有了实质性进展，通过磁带输送到机器中的数据控制着生产装配零件机器的运转。除制图和制表外，这一切对工程设计者并没有直接影响。

20 世纪 60 年代初，随着计算机辅助设计的引入产生了一场重大变革。CAD 允许设计者以图形方式与计算机交互作用，工程技术人员能够检验一个设计思想，并很快地查看到设计效果，然后对其进行修改和重新评价。如此循环往复，直至形成一个合格的设计。每重复一次，

设计方案都会得到进一步的改善。因此，在时间、材料和资金允许的条件下所执行的循环次数越多，设计效果就越好。

计算机能加快设计进程，提高设计过程的精确性。它能够在短时间内完成大量的、复杂的计算并得出准确和可靠的结果。由于在有限的时间内某些设计所需要的大量计算不能简单地由人来完成，计算机的上述特征证明其作为一个设计工具的作用是无法估价的。

CAD 依赖于计算机内阴极射线管（电视显像管）的使用。技术人员借助于键盘、光笔或其他输入设备将有关设计的描述输入到计算机，然后命令计算机按指定的方法修改设计，如添加或删除一些线条。任何时刻设计师都可以命令计算机模拟正在设计部位的真实工作情况。例如，设计师可以确定在一定压力下部件的工作状况，或者暴露在阳光下或承受摩擦时热量将如何流动。此外，设计师可以使用光笔用各种方法去修改设计，以便获得性能改善。设计师每进行一次修改，都要命令计算机进行一次新的评定。

CAD 之所以如此有效，是因为计算机和设计师不是用数字而是用图像进行交流，而图像更容易为人类思维所接受。该方法也允许对正在设计的元件进行模拟测试和评价，测试的结果以图形或数字的形式叠加到显示屏幕上。例如，如果该元件正在被加热，其各部分将会用不同的颜色着色，每一种颜色代表某一特定的温度范围。这种有效的图像表示方式有助于设计师精确地发现正在发生的情况。这与从 500 页字母数字打印稿中取出同样信息的耗时、费力、非常令人心烦的过程形成鲜明的对比。

应用计算机辅助设计传统模型技术的驱动力是希望通过自动完成设计上更繁复冗长的程序，从而提高设计者的生产力和提高设计模型的精确性。已经开发的新技术正尝试克服传统实践上的局限性，特别是处理复杂问题，如汽车车体某些设计的复杂形式或集成电路一类产品结构的复杂性。CAD 使设计者能更快更准确地完成任务并提供了唯一的解决问题途径。

CAD 包含中央设计描述的发展，它决定了所有的设计和制造。这意味着用于分析和模拟设计以及产生制造指令的以计算机为基础的技术，应该与设计的形式和结构建模技术密切结合。另外，中央设计描述为同时存在的模拟工程活动设计的全部方面的开发打下了良好的基础。原则上，CAD 能够应用于设计的全过程，但实际上，它在开始阶段广泛使用诸如草图等非常不准确的描述所造成的影响，使它具有一定的局限性。还必须强调的是，目前 CAD 还不能帮助设计者设计更富有创造性的产品，比如产生可能的设计方案，或那些包含设计复杂推理的方面。如通过视觉检验来评估一个部件是否做好，或是否与要求符合。然而，这些方面是当前正在研究的课题。

计算机可以将大量的信息保存在磁盘这样的永久性介质上或临时存储在当前访问的存储器中。因此，以数字形式描述一个工程图纸的细目或一个汽车车身的造型，并把信息存储在存储器中都是可以做到的。这些数据能从存储器中检索、快速转换并显示在视频显示器图形屏幕上，或交替地利用绘图仪绘制在纸上。此外，设计者还可以迅速、容易地更新或修改图纸的任何部分，也能把修改后的图纸数据写回到存储器中。

计算机辅助设计的功能可以归结为 4 种不同的类型：

1．设计和几何造型。

2．工程分析。

3．运动学分析。

4．作图。

在设计和几何造型阶段，工程师描述将要制造的零件的基本形状，计算机把这些输入信息

转换成数学模型，并将它存储起来供以后使用。数学模型建立后，由计算机完成的工程分析将确定如重量、体积、结构强度、受热特性、导电性能等基本参数。借助于计算机模拟运动学分析，设计人员可以确定运动部件或其他结构是否会干扰正在设计的零件的运动。最后，作图程序将为制造商绘制所要求的部件的图形及图形化的表达信息。

在研究通用 CAD 系统时要考虑该系统应具有尽可能广的应用范围，仔细考虑以下几个方面：

- 机械工程设计。
- 建筑设计。
- 结构工程设计。
- 电子电路设计。
- 动画和图形设计。

对大多数实际应用来讲，应考虑把通用作图系统结合到大型专用系统中，由于此原因作图系统应尽可能简单，而且运行效率高，因而这种结合不需要花很多精力。

对分析作图和绘图分析这两个过程而言，在由作图系统所产生的数据和分析程序之间必须有一简单的联系。另外，图形数据可用能被分析程序识别但不对作图系统产生影响的方法进行注释。

阅读材料

CAM 介绍

工程的主要目标是把思想转化成经济而可靠的产品。设计某个部件并把它提交制造的过程经常涉及相当大的投资，并且要凭借各种学科和资源。工程是产品设计、产品制造流程和公司生产优质产品能力的关键。产品设计决定了功能、外貌、生产成本以及对制造操作进行计划和控制的能力。

工程设计已深深地受到设计人员可利用的 CAD 技术和工具的影响。类似地，制造也因数控（NC）机床和计算机数控（CNC）机床的引进而经历了重大变革。这些代替了常规机床，因此呈现出灵活性增加、精确度变优和生产周期更短的特点。采用常规机械加工法对复杂的（雕刻品）表面机械加工既不经济又不精确。这些表面能在各种各样的组件中找到，这些组件包括飞机、汽车、建筑和农业设备、机床本身、器械、摄像机以及仪表箱等。

工程和制造集成的潜在利益已被充分认识到了，更准确地说，CAD 和 CAM 的完全集成是工厂自动化的重要方面。

历史上，CAD/CAM 集成开始于 NC 技术的开发。NC 机床一直在硬件控制和软件开发两方面不断地改进着。NC 零部件加工程序设计和交互计算机图形技术已对这些开发做出了重大贡献。CAD 和 CAM 的集成日益把重点放在 NC 机床的工具和路径上。关注开始处于 CAD/CAM 谱系完全相反的两端的 CAD 和 CAM 如何独立发展并在 CAD/CAM 系统演变过程中它们如何渐渐地彼此靠近是很有趣的。产品的制造依靠诸如人员、机械和设备等不同的资源。制造系统可以定义为人员、机械与为原材料和信息流所限的设备之组合。制造系统可分成离散的部件制造和连续处理的制造。

制造过程从高产量生产的传输线技术变化到低产量项目的加工车间工艺流程。制造系统可分类成下列几个系统。

1．传输线。这代表最早类型的制造系统。传输线对于大批生产（高输出率的大量生产）很有效。它们代表了往往称为硬自动化的那一类。它们适合于制造完全相同的部件，因此它们是不灵活的，不能承受部件设计中的变化。部件设计中的任何改变都要求传输线停工，并在机械上做改进以适应新产品的生产。此外，如果在部件设计中出现大的变化，那么此传输线便将过时而废弃不用。

2．专用制造系统。这类系统与下面两类系统一起代表各种类型的 CIM（计算机集成制造）系统。这类系统是最不灵活的，但其制造单元是最灵活的。该系统适合于生产个数十分有限的不同部件，并且每个部件的生产率是中等的。该系统以类似于传输线的方式构成，因此系统中只可能存在有限的一些变化。

3．灵活制造系统（FMS）。这类系统适用于中等产量的、种类适中的生产范围。大多数系统活动和协调是在计算机控制下自动完成的。工作部件被自动地装在处理系统（货盘）的中心位置上，并经由指定路线传送给适当的机床。FMS 中计算机的工作包括对机床和原材料处理系统的控制，从而监控系统性能和调度生产。FMS 并不完全在计算机控制下。为装置生产用机床，也即装卸工作部件、准备和改变工具，以及进行机床的初始安装等都需要人和人的劳动。

4．制造单元。这是最灵活的 CIM 系统。三种类型（这里介绍的系统 2、3 和 4）中它有最低的生产率。一个制造单元典型地包括很多独立的机床和机器人。

5．独立的数控机床。这些机床是高度灵活的。它们的生产率由于工具组装时间和工具的改变而太低。它们是高度可编程的，并且能处理产品变更和部件设计的改变。它们适合于加工车间和小批量制造。

3.4 计算机动画

课文

计算机生成动画的代表性应用有娱乐（电影和卡通片）、广告、科学和工程研究以及培训和教学。尽管我们在考虑动画时倾向于想到暗指对象的移动，但术语“计算机动画”通常指场景中任何随时间而发生的视觉变化。除了通过平移、旋转来改变对象的位置外，计算机生成的动画还可以随时间进展而改变对象大小、颜色、透明性和表面纹理等。广告动画经常把一个对象形体变成另一个。例如，将一个汽车油罐变成汽车发动机。计算机动画还可以通过改变照相机的参数而产生，如位置、方向和焦距。还可以通过改变光照效果和其他参数以及照明和绘制过程来生成。

许多计算机动画的应用要求有真实感的显示。利用数值模型来描述的雷暴雨或其他自然现象的精确表示对评价该模型的可靠性是很重要的。同样，培训飞机驾驶员和大型设备操作员的模拟器必须生成环境的精确表示。另一方面，娱乐和广告应用有时较为关心视觉效果。因此可能使用夸张的形体和非真实感的运动和变换来显示场景。但确实有许多娱乐和广告应用要求计算机生成场景的精确表示。在有些科学和工程研究中，真实感并不是一个目标。例如，物理量经常使用随时间而变化的伪彩色或抽象形体来显示，以帮助研究人员理解物理过程的本质。

动画的设计过程

通常，一个动画序列按照以下几步进行设计：

- 故事情节拆分。
- 对象定义。
- 关键帧描述。
- 插值帧的生成。

这种制作动画片的标准方法也适用于其他动画应用，尽管有许多专门的应用并不按此序列进行处理。例如，飞行模拟器生成的实时计算机动画按飞机控制器上的动作来显示动画序列。而可视化应用则由数值模型的结果来生成。对于逐帧动画，场景中每一帧是单独生成和存储的。然后，这些帧可以记录在胶片上或以“实时回放”模式连贯地显示出来。

剧本是动作的轮廓。它将动画序列定义为一组要发生的基本事件。依赖于要生成的动画类型，剧本可能包含一组粗略的草图或运动的一系列基本思路。

为动作的每一个参加者给出对象定义。对象可能使用基本形状如多边形或样条曲线进行定义。另外，每一对象的相关运动则根据形体而指定。

一个关键帧是动画序列中特定时刻的一个场景的详细图示。在每一个关键帧中，每一个对象的位置依赖于该帧的时刻。选择某些关键帧作为行为的极端位置。另一些则以不太大的时间间隔进行安排。对于复杂的运动，要比简单的缓慢变化运动安排更多的关键帧。

插值帧是关键帧之间过渡的帧。插值帧的数量取决于用来显示动画的介质。电影胶片要求每秒 24 帧，而图形终端按每秒 30~60 帧来刷新。一般情况下，运动的时间间隔设定为每一对关键帧之间有 3~5 个插值帧。依赖于为运动指定的速度，有些关键帧可重复使用。一分钟没有重复的电影胶片需要 1440 帧。如果每两个关键帧之间有 5 个插值帧，则需要 288 幅关键帧。如果运动并不是很复杂，可以将关键帧安排得稀一点。

可能还要求其他一些依赖于应用的任务。包括运动的验证、编辑和声音的生成与同步。生成一般动画的许多功能现在都由计算机来完成。

开发动画序列中的某几步工作很适合由计算机进行处理。其中包括对象管理和绘制、照相机运动和生成插值帧。动画软件包，如 Wave-front，提供了设计动画和处理单个对象的专门功能。

动画软件包中有存储和管理对象数据库的功能。对象形状及其参数存于数据库中并可更新。其他的对象功能包括运动的生成和对象绘制。运动可依赖指定的约束，使用二维或三维变换而生成。然后可使用标准函数来识别可见曲面并应用绘制算法。

另一种典型功能是模拟照相机的运动，标准的运动有拉镜头、摇镜头和倾斜。最后，给出对关键帧的描述，然后自动生成插值帧。

Flash 动画制作

Flash 的标准工作环境包括菜单栏、工具栏、舞台、时间轴窗口和工具面板。除了这几个主要的部分，打开 Windows 菜单，还可以调出素材窗口等小窗口。

工作区域就是 Flash 的工作平台，它是一个比较大的区域，实际上涵盖了下面要说的舞台以及画图和编辑动画的工作对象。可以把它看做是后台和舞台的结合。

舞台是 Flash 动画中各个元素的表演平台，舞台将显示当前选择的帧的内容。与工作区域不同的是：动画发布后只有在舞台上的内容才能被看到，而舞台之外的工作区域中的内容就如

同在后台的演员和工作人员一样不会被观众看见。就像戏剧可以有几幕一样，舞台上也可以放下几个场景。注意在舞台的右上部分，有两个小按钮，其中的第一个就是场景切换的按钮。可以通过不同的场景之间的交互性，来创作出非常复杂的作品。

时间轴窗口用于对 Flash 的两个基本元素层和帧进行操作。在系统默认设置下，时间轴窗口以编辑栏的形式出现在舞台的上面，紧靠上边框。使用者可以根据需要或爱好，用鼠标拖动该编辑栏到 Flash 界面的其他位置，甚至将其拖出边框，使之成为可自由移动的浮动窗口。时间轴控制窗口分为左右两个区域，它们分别是层控制区和时间轴控制区。

使用层可以设定动画中各元素的上下叠放次序。层控制区位于时间轴窗口的左边，是进行层显示和操作的主要区域，由几个层功能操作示意列和按钮组成。当前舞台中正在编辑作品的所有层的名称、类型、状态都会按照层的放置顺序排列在层示意列中。在层控制区中，不但可以显示当前作品的层及所属信息，还可以对某一个或部分层进行操作，如新增层、删除层、改变层的放置顺序等。时间轴窗口的右半部分是时间轴控制区域，该区域主要由若干行与左边层示意列对应的帧序列、示意列、时间轴标尺、信息提示栏以及一些用于控制动画显示和操作的工具按钮组成。它用于对各帧的播放和放置进行有效的控制。

阅读材料

在 线 游 戏

在线游戏是指在计算机网络上、更多的是指在互联网上玩的视频游戏。在线游戏的发展反映出计算机网络从小的局域网到互联网的总体扩展，而互联网也在不断发展。在线游戏的范围包括从简单的基于文本的游戏到由很多玩家同时参与的结合复杂的图形和虚拟世界的游戏。很多在线游戏拥有相关的网络社区，使在线游戏成为一种超越单个玩家游戏的社会行为。

Flash 和 Java 流行度的提高带来了互联网的革命，网站上可以采用流畅的视频及一整套新型的用户交互方式。当微软开始将 Flash 包装为 IE 的一个预设组件时，互联网就开始从一个数据/信息领域转变为同时也应需求提供娱乐的平台。这种进步使网站上提供游戏进行网上冲浪更容易了。很多游戏如 Club Penguin、World of Warcraft、Final Fantasy Ⅺ和 Lineage Ⅱ，可以采用月付费方式订购他们的服务。很多其他网站依靠站点赞助商提供的广告收入来运行，而另一些网站，如 RuneScape，则让人们免费玩游戏，同时为玩家提供付费的选择，为会员开启游戏新技巧。

2001 年网络泡沫破灭以后，很多纯粹依靠广告收入的网站面临着极大的困境。尽管在线游戏网站营利越来越少，一些网站还是从起伏不定的市场中幸存下来，它们用内容作为交叉促销的工具驱使网站访问者去访问公司的其他网站来弥补广告收入的损失。

在线游戏始于 20 世纪 80 年代的 MUD，即简单的基于文本的多玩家游戏，通常使用调制解调器在 BBS 上玩。这些游戏频繁地基于奇幻的设置，采用类似于角色扮演游戏 Dungeons & Dragons 的规则。也有其他风格的游戏，如下象棋、拼字克隆和其他棋盘游戏。由于连续连接费用昂贵，访问通常按分钟收费，一些游戏设置为通过电子邮件来玩。

20 世纪 90 年代，在线游戏开始从各种各样的 LAN 协议向使用 TCP/IP 协议的互联网上转移。Doom 使死亡竞赛的概念作为一种新型的在线游戏广为流行，死亡竞赛是指多个游戏玩家相互进行殊死搏斗。

家用游戏机变得更像计算机，在线游戏的玩法也在扩展。一旦在线游戏开始充斥市场，

Playstation 2、Dreamcast 和 Gamecube 这样的开源网络和 PC 游戏一同利用了在线功能。

随着万维网的发展及浏览器变得更加复杂，人们开始开发以网络浏览器作为客户的浏览器游戏。简单的单个玩家的游戏能够通过 HTML 和 HTML 脚本技术，用网络浏览器玩。更复杂的游戏需要与网络服务器打交道，以营造一个多玩家的游戏环境。

基于网络的图形技术的发展，如 Flash 和 Java，允许浏览器游戏设计得更复杂。这些游戏也由于其相关技术如“Flash 游戏”或“Java 游戏”而变得日益普及。很多游戏最初发布于 20 世纪 80 年代，如 Pac-Man 和 Frogger，被再开发为可以使用 Flash 插件的在网页上玩的游戏。大多数浏览器游戏限定于多玩家来玩，通常单个玩家游戏具有被所有玩家分享的高分列表。

基于浏览器的宠物游戏在在线游戏者的年轻一代中非常流行。这类游戏从拥有上百万用户的巨型游戏如 Neopets，到小型的和基于社区的宠物游戏都有。近期基于浏览器的游戏采用如 AJAX 的网络技术以实现更复杂的多玩家交互式游戏。

随着很多发展中国家对外互联网访问量的扩展，大规模的多玩家在线游戏变为可能，应用互联网可以实现成千上万的玩家同时玩一个游戏。

3.5 多媒体软件

课文

Dreamweaver

Macromedia Dreamweaver 是为可视化设计并管理网站和网页的一个专业的 HTML 编辑器。不论你是比较喜欢手写代码还是在可视化编辑的环境下工作，Dreamweaver 都能使你快速入门并提供有用的工具以加强你的网络设计经验。

Dreamweaver 包括许多编辑工具和属性：HTML、CSS、JavaScript 参照和 JavaScript 调试器，代码编辑器允许你直接在 Dreamweaver 中编辑 JavaScript、XML 以及其他文本文件。Macromedia 的双程 HTML 技术可以导入 HTML 文档而不会重新格式化，而且你如果愿意也可以设置 Dreamweaver 清理或重新格式化 HTML。

Dreamweaver 的可视化编辑的特征也让你能快速把设计和功能加到你的页面，而不用写一行代码。能查看你所有站点的元素或资源，并且直接从一个容易使用的面板拖曳它们进入一个文件。通过在 Micromedia Fireworks 中创建并编辑图像来优化开发工作流程，然后直接将它们导入 Dreamweaver，或加入直接在 Dreamweaver 创造的 Flash 对象中。

Dreamweaver 是可完全自定义的。使用 Dreamweaver 来创建有个性的对象和命令，修改快捷键，甚至写 JavaScript 来拓展 Dreamweaver 在新的行为、属性面板以及站点报告上的能力。

Dreamweaver 能以三种方式显示一个文件：即设计视图、代码视图、设计与代码结合视图。在 Dreamweaver 工具条选择视图，就改变正在工作的视图。Dreamweaver 的默认设置是以设计视图显示文档窗口。

此外，在 Dreamweaver 的设计视图下，能工作于布局视图和标准视图两种不同的方式。可以在对象面板的视图分类中选择这些视图。在布局视图可以设计页面布局，插入图形、文本和其他媒体元素。在标准视图下，除了插入图形、文本和媒体外，还可以插入图层、创建帧文件、创建表以及做其他在布局视图无法做到的改变。

Adobe Photoshop

Adobe Photoshop 是具有对照片修正、图像编辑和彩色绘画功能的软件。不论你是一位初学者，还是一位图像编辑方面的专家，Photoshop 程序都为你提供了获得专业水准作品所需的多种工具。

为了更好地进行图像的制作与输出，Photoshop 提供了编辑矢量图形和文本的一套完整工具。用这些新的工具，你可以将与分辨率无关的矢量图形、字体和像素图像进行混合编辑，以获得无与伦比的设计效果。

新的矩形、圆角矩形、椭圆、多边形、直线等工具，可以用来生成各种矢量图形。这些工具可以用来制作图形层。像 Adobe Illustrator 一样，为快速地将基本矢量图形合并为复杂的图形，Photoshop 提供了并、交、差、补等寻径操作。

使用 Photoshop，可以非常容易地将与分辨率无关的字体和像素图像进行混合，然后随着图像输出的是字体清晰的外轮廓，从而产生高质量的输出结果。此外，Photoshop 还扩充了新的字体格式控件，以生成很好看的文本，包括新的字体变形——可以扭曲、拖拉文字以产生“酷”的效果。最大的优点是仍可在图像上直接对字体进行编辑操作。

Photoshop 提供了一种新的直观的图层效果界面、新的效果选择，并可将你设计的图层效果作为图层样式存储，以供日后使用。新的图层样式对话框使你一眼就能看出对当前图层使用的效果，并且还允许你在图层样式中对所使用的效果进行定义。一旦你存储为图层样式，它就会出现在新样式模板中。

应用图层样式非常容易：可以先在一个图层上制作文字、图形或其他艺术作品的元素，然后单击样式模板上的一种样式以应用于该图层。

用新的切片工具和切片选择工具，可以直接在 Photoshop 中切取 Web 所用的图。通过切片工具在图像的不同区域上拖拽，可以创建用户自定义的切片组。对没有定义的区域，Photoshop 会自动定义切片组，这样在输出时可以生成一个 HTML 表。可以修改 Photoshop 切片组的许多特性，其中包括尺寸、位置、堆栈的顺序和清晰度。

PowerPoint

PowerPoint 是多媒体演示软件，是 Office 套件软件之一，它提供制作多媒体演示的手段。PowerPoint 有很强的制作幻灯片的功能。你可以容易地在幻灯片上输入标题和文本，加上蒙太奇图画、表格、图形，又可以改变幻灯片的布局、调整它们的顺序、删除或复制幻灯片。

进入 PowerPoint 后，首先出现“启动对话框”，它提供四种方法建立演示文稿。演示文稿是一系列的幻灯片；每张幻灯片可以看做是书的一页，一张幻灯片可以用来演示提纲、文本、数字、分析表格或图像等，使用“链接”，可以实现超文本和超媒体。每一幻灯片都遵从标准的样式，称为“模板”。在演示软件中有各种各样的模块库供选用。

利用“视图”按钮，PowerPoint 可以进行视图切换。不论选择什么视图，演示文稿的内容都保持不变。PowerPoint 提供五种视图。

普通视图——这是最常用的视图。利用这种视图，你可以把全部幻灯片置于一个序列中，或把演示文稿的所有幻灯片置于一个结构中。

大纲视图——当切换到大纲视图时，你可以编辑演示文稿的大纲结构。

幻灯片视图——在这种视图中，你可以演示每张幻灯片并编辑它的细节。

预览视图——在此视图中，每一张幻灯片为缩小的视图。演示文稿中的完整文件和图片都

可以展示。你可以重新安排它们的顺序，增加切换和动画效果并设定放映时间。

幻灯片放映——它实现幻灯片的放映。在幻灯片视图下，放映从当前页开始，在预览方式下，放映从选择的页开始。

图和表帮助观众清楚地看到趋势和比例。Excel 中的电子表格和图表可以引进到幻灯片，表现出二维或三维的效果；可以采用旋转的图表或电子表格以增强视觉效果；还可以把多个图合成一个图，或把图与对应的图表和电子表格结合到一张幻灯片里。

自定义动画效果用得最多而且适用于更多的对象。首先，从“幻灯放映”菜单选择“自定义”命令，以便打开“自定义”对话框。然后，设定每一对象的放映顺序（可以在放映前一对象后立即或在几秒钟后放映这一对象，或者用鼠标单击），然后与声音效果一起设定动画效果。如果该对象是照片，动画效果是必要的；如果它是文字，就可以逐字或成组地放映它们。

可以在演示文稿中增加超级链接以转移到不同位置，例如，跳到一个幻灯片，其他的演示文稿，Word 文件，Excel 电子表格或其他的应用程序等。要做到这一点，首先，要选定准备作超级链接的文本或对象；第二，在“插入”工具栏上使用“超级链接”命令；第三，单击在“插入超级链接”对话框中准备作超级链接的幻灯片或文件。在放映时，当鼠标到达该对象（有下画线）或已作了超级链接的对象时，鼠标的箭头就变成“手”型，这是超级链接的符号。

利用在“幻灯放映”菜单中的“动作”按钮，就可以把各种动作按钮插入到幻灯片上。这样做时，一个“动作设定”对话框就会自动弹出；可以在“超级链接表”里选择跳到的位置。

阅读材料

视频图像压缩

计算机不能直接处理模拟信息——它们必须模仿模拟信息。计算机首先对视频图像数字化，或者说把模拟帧分成许多独立的图像元素（像素）。一个 640×480 的帧需要 307 200 个像素，每个像素用一个字节来存储。再加上高质量视频图像所需的 24 位颜色深度。这就使需要量增加两倍，即每帧需 921 600 个字节。以每秒 30 帧的速率计算，则达到每秒处理 920 万个像素，超过 27MB 数据！这不仅提出了惊人的存储和带宽问题，其数据量超过了功能最强大的台式计算机所能实时处理的量。

一些简单的“缩放”技术用来减小这种负载。首先是缩小图像的大小。四分之一屏幕大小的视频图像（320×240）需要整屏图像（640×480）的四分之一带宽，这就降到每秒 6.912MB。其次是降低帧率，即每秒显示的帧之数目。大多数视频图像达到 30 帧/秒（fps），与电视一样。从 30fps 降到 15fps，数据速率减低一半，到大约每秒 3.5MB。最后是减少颜色深度。从 24 位减到 8 位，数据速率又减少了 2/3，降到了每秒 1.1MB

遗憾的是，即使每秒 1.1MB 的数据率对四倍速的 CD-ROM 驱动器和大多数非 SCSI 硬盘还是太高，因此，缩减图像大小、帧率和颜色深度仍不能解决问题，这就是为何要进行视频图像压缩的原因。

视频图像压缩是一组用来缩小视频图像文件大小的技术。由称为 codecs（压缩/解压）产品所体现的这些方法分为两大类：帧间压缩和帧内压缩。

帧间压缩利用关键帧和δ系统。δ帧或“差异”帧，仅记录帧间变化。解压时，CPU 从关键帧和累加的δ帧来构造各个帧。

帧内压缩是完全在个别的帧内进行的。在帧内压缩时，codecs 使用各种技术把像素转换成

更紧凑的数学公式。最简单的技术称做行程长度编码（RLE）。按这种编码法，各行中相邻的相同像素串归在一起。

帧内压缩技术从简单的 RLE 到已成文档的诸标准，如 JPEG，到一些特殊数学方法，如小波和分形变换。不是所有的 codecs 既用帧间压缩技术，又用帧内压缩技术——一些只用帧内压缩。那些使用两种压缩技术的 codecs 在消除了帧间冗余后，对关键帧和δ帧内的信息进行帧内压缩。

标准的视频图像源，如摄像机、录像机或光盘播放机把模拟视频信号传送给视频捕获卡，与此同时模拟音频信号被发送给 PC 内的声卡。

捕获卡利用模/数转换器（ADC）把模拟视频信号转换成二进制代码。这些视频图像信号能被捕获作为连续的原始视频帧，发送到并保持在系统的随机存取存储器中，在那里用软件对它们进行压缩。

同时，音频信号经历了由声卡的转换器对它进行的模/数转换。此信息也发送到 PC 的主系统随机存取存储器。

在已捕获视频和音频信道后，这些被捕获的信号可以直接存储到硬盘上，也可用软件对它们进行压缩。通常这些数字视频和音频信号被存储为同步的或交错的.AVI 文件，放在硬盘上。

第 4 单元　网 络 知 识

4.1　计算机网络

课文

网络建立了计算机之间的通信。当人们在不同的地方工作时，该系统是特别有用的。它提高了通信的速度和准确性，可防止信息被放错地方，且可自动确保关键信息的分发。

一个网络中包含了若干台由通信线路连接起来的计算机。这些计算机能单独工作，但它们的活动也是相互协调的。将计算机连接起来的最初目的是在不同大型机用户间交换信息（程序，数据文件）。当更小的计算机出现，并且在一个小机构内部也有很多台机器，把这些小的计算机连接起来以共享资源（打印机、磁盘、处理时间）也变得很吸引人了。把这些不同型号、不同大小的计算机连接起来，但又保留其独立性而产生的系统称为计算机网络。

局域网和广域网

局域网（LAN）是专有的通信网络，它可以覆盖一个有限的地域，如一个办公室、一幢建筑或一群建筑等。局域网是通过一个通信信道把一系列计算机终端连接到一个小型机上，或更普遍的是把若干台个人计算机连接到一起而形成的。复杂的局域网可以连接各种办公设备，如字处理设备、计算机终端、视频设备以及个人计算机等。局域网的两个基本应用是硬件资源共享和信息资源共享。硬件资源共享可使网上的每一台计算机访问并使用由于太昂贵而无法为每人配备的设备。信息资源共享允许局域网上每一个计算机用户访问存储于网上其他计算机中的数据。在实际应用中，硬件资源共享和信息资源共享是常常结合在一起的。

广域网（WAN）相对于局域网，在覆盖的地理范围上要更大一些，它使用电话线、微波、卫星或这些通信信道的组合来传递信息。公共的广域网公司包括所谓的电信公司（如电话公

司)。电话公司反而鼓励很多公司去组建其自己的广域网。

网络配置

通信网中设备的配置（或称物理布置）称为拓扑（topology)。通信网络通常被配置为三种模式中的一种或它们的组合。这些配置是星形、总线和环形网络。虽然这些配置也可用于广域网，在此仅在局域网中对它们进行说明。连接到网络上的设备，如终端、打印机或其他计算机称为节点。

- 星形网络

星形网络由一台中央计算机和一台或多台连接到该中央计算机上并形成星形结构的终端或计算机组成。纯粹的星形网络仅由终端和中央计算机之间的点对点的连线组成，但是大多数星形网络，由点对点的连线和多点连线组成。星形网络配置通常用于中央计算机中含有处理来自终端的输入请求所需要的全部数据的场合，如航空订票系统。如果查询是在星形网络上处理的，那么回答该查询所需的所有数据应该包含在存储于中央计算机的数据库中。

星形网络效率相对较高，严密的控制可保证网上处理的数据的安全。其主要缺点是整个网络都依赖于中央计算机及其相关的硬件和软件，如果其中任何部分不能正常工作，整个网络就会瘫痪。所以，在大多数大型的星形网络中，都有一个备用的计算机系统，以防止主系统出现故障。

- 总线网络

使用总线网络时，网络中的所有设备都连接到同一根电缆上。信息可以从任何一台个人计算机向任何方向传给另一台计算机，任何信息都可以被传送到某一指定设备。总线网络的优点是设备可以从任何一点连接到网络，或从网络的任何一点取下，而不会影响网络其他部分的工作。此外，如果网络上的某台计算机出现故障，不会影响网络上其他用户。

- 环形网络

环形网络不使用中央计算机，连接成一个环形来实现计算机之间的相互通信。当处理不是在中心位置而是在当地进行时，环形网络是非常有用的。例如，计算机可以放在三个部门：财务部、人事部和收发部。这三个部门的计算机可以分别完成各部门所要求的处理。但是收发部门的计算机偶尔需要与财务部门的计算机通信，以修改存储在财务部计算机上的某些数据。数据只能沿着环形网络的一个方向顺序通过每个节点进行传送。因此，环形网络的缺点是如果一个节点出现故障，由于数据不能通过出现故障的节点，就会使整个网络无法工作。环形网络的优点是所需的电缆线少，因此，网络的电缆费用较低。

网络设备

网桥用来连接在物理上分开的两个网络。网桥将处于 OSI 参考模型的数据链路层上的系统连接起来。对用户来说，通过网桥连接到本地系统上的资源与本地资源用起来是一样的。更新的智能网桥能够过滤或分离网络信息流，从而防止一些本地信息包不必要传送到远地的系统。

网桥是独立于通信协议的。一旦建立起物理连接，网桥就能传送任何更高层的网络协议。让负担过重的网络恢复正常性能的最简单方法是用网桥把网络一分为二。用网桥把两个网络连接起来，使本地数据流在本地传送，而那些不在本地子网上的信息包在工作站之间传送。

路由器的建立比网桥更为复杂。路由器在 OSI 的第三层——网络层上，把局域网连接起

来。它们与网桥不一样，网桥只是简单地在两个物理上分开的或拓扑结构不同的网络间传送高级网络协议，而路由器检查网络信息包的目的地，并在需要时能重新确定网络信息流的方向。一个路由器可连接两个以上的系统并将网络信息流引至合适的系统。

网关把硬件和软件结合起来，连接运行不同协议的局域网。网关对 OSI 网络层（第三层）以上的所有协议进行转换，由于它们通常连接完全不同的系统，所以它们也进行协议转换和网络地址转换。对工程师来说，网关比网桥或路由器更复杂。在网关与网桥间存在着一些微妙的区别：网关连接不同的网络，而网桥连接相同的网络。

阅读材料

互　联　网

互联网上的每一台计算机都是一个唯一的叫做“点间隔形式”IP 地址的一部分。例如，校园网或商业网上的计算机都有相对于 IP 地址的子网编号。

Internet 是相互连接起来的政府、教育以及商务计算机网络的国际互联网——实际上是一种网络的网络。人们使用相应的软件，通过计算机终端或者个人计算机在 Internet 上进行交流。他们将数据放进一个网间协议（IP）数据包中——一个电子信封，并附上该数据包要送到 Internet 网上特定目的地的“地址”。介于起始和终点网络之间的通信软件“读到了”流经 Internet 网数据包上的地址并将这些数据包转送至目的地。

如何使用互联网

不管正在运行何种程序或执行何种任务，Windows 使你能快速而方便地访问互联网。活动桌面使你能定制工作环境，任一窗口中的地址条帮助你接入互联网。你还会发现系统提供了帮助你与他人及另外的计算机进行交流的许多工具。

大多数人通过网络连接或互联网服务提供商（ISP）连接到互联网。ISP 向你提供了用于拨号登录到互联网服务器的服务号码。一旦你接入系统，就能访问互联网，使用 ISP 所提供的电子邮件及所有其他服务。ISP 也会向你提供详尽的信息，用于对计算机连接互联网进行配置。如果使用了网络连接，系统管理员会提供这些信息。

使用包含在 Windows 中的通信工具，就能利用计算机发送电子邮件、处理电话呼叫、发送传真或举行视频会议。例如，你能使用电话拨号程序回答电话或参加公司的视频会议。通过 Internet Explorer 和互联网连接，可以在互联网上查找并浏览信息。可以在地址栏内输入想要访问的网页地址，或从收藏表中单击某一地址。Internet Explorer 也使你能在互联网上找人，查询某个企业，以及感兴趣的相关主题信息。

互联网服务

最流行和应用最广的互联网应用服务包括如下诸方面。

（1）万维网（WWW）。

万维网是一种提供互联网服务的大型网络，它向运行客户应用程序，如浏览器软件的终端提供超文本和其他服务。万维网允许用户从动态链接信息的全球网络服务器系列中搜索、访问和下载信息。Web 客户通常通过 Web 浏览器，向服务器传送用户需要信息的请求。服务器与客户通过传输协议，通常是超文本传输协议（HTTP）进行通信。然后，服务器用统一资源定

位地址（URL）访问网页，搜索引擎可用来简化访问，它允许用户输入有关专题的搜索条件，从而使若干 URL 返回有关所需信息的网页。

（2）电子邮件（E-mail）。

电子邮件让用户能撰写信函并将其发送给一个人或一群人。邮件应用程序的另一功能是允许用户去阅读已经收到的信函。在互联网上有两种电子邮件协议，一种是简单邮件传输协议（SMTP），它接收传输的邮件并从中复制报文到相应的邮箱；另一种邮件协议是邮政协议 3（POP3），它从远程邮箱中取出电子邮件并将其存储在用户本地机器上，以便于以后阅读。

（3）文件传输协议（FTP）。

FTP 是 TCP/IP 协议栈中的应用协议，用来在网络节点间传送文件。TCP/IP 协议包含一种文件传应用程序，它允许用户发送和接收任意规模的程序或数据文件。例如，利用文件传输程序，可将含有卫星图像的大型数据库，用 Pascal 或 C++语言写的程序，或者一本英语字典从一台机器复制到另一台机器上。该系统提供一种对授权用户的检查方法，甚至可阻止所有的访问。

（4）远程通信网（Telnet）。

Telnet 是 TCP/IP 协议栈中的标准终端仿真协议。Telnet 用于远程终端连接，允许用户登录到远程系统上，并像连接到本地系统那样使用资源。远程登录将用户屏幕窗口直接连接到远程机器上，于是，用户键盘上的每一个击键都发送到远程机器上，而远程计算机在该用户窗口上输出的每一个字符都会显示出来。当远程登录会话终止时，该应用程序再将用户返回到本地系统。

4.2 网络搜索引擎工作原理

课文

对于互联网和它的重要组成万维网来说，好消息是那里有着数以百万计的网页，包括各种各样的信息供人查阅。然而不幸的是，这些成千上万的网页中，很多标题源于其作者的突发奇想，几乎所有的网页在其服务器上都有个怪名字。那么，要如何找到所需要的网页呢？大多数人都会去求助于网络搜索引擎。

网络搜索引擎是特殊的网站，它是为了帮助人们查询所需的在其他网站上的信息而设计的。不同的搜索引擎工作的方式是不同的，但他们都包含以下三部分内容：

- 根据搜索的关键字搜索整个网络或网络的一部分。
- 把所找到的关键字以及它所出现的位置，作为索引保存下来。
- 允许用户在该索引表中查询各种关键字或关键字的组合。

早期的搜索引擎能够搜索几十万个网页和文档，每天大约为一两千个请求提供服务。现在，一个顶级的搜索引擎能够搜索上亿的网页，并且每天响应数千万的搜索请求。

当大多数人谈到搜索引擎时，他们所指的是 WWW 的搜索引擎。在 WWW 成为互联网最为重要的组成部分之前，已经有搜索引擎在帮助人们在网上搜寻所需要的信息了。一些像“Gopher”、“Archie”的程序记录了存储在网络服务器上的文件的索引，并极大地减少了查询程序和文档所需的时间。在 20 世纪 80 年代晚期，能在网络上得到有价值的东西意味着要知道如何使用 Gopher、Archie、Veronica 和其他一些搜索引擎。

要在上百万的网页中找到所需的信息，搜索引擎需要一个叫做“蜘蛛”的特别软件“机器人”来帮助它建立在网站上搜索到的关键字的列表。蜘蛛建立列表时，其过程称为网络爬行。

为了建立并维护一个有用的关键字列表，搜索引擎的蜘蛛们需要查询大量的网页。

蜘蛛是如何开始它的网络爬行的呢？通常的起点是那些最常用的服务器和最流行的网页。蜘蛛会从一个流行的站点开始，将它网页上的关键字建立列表并且跟踪这个网页上的每个链接。通过这个方式，蜘蛛系统迅速地开始扩展，在网络上最为常用的网页上形成广泛的分布。

Google 网最初是一个学术搜索引擎。在一篇描述该系统是如何建立的论文中，Sergey Brin 和 Lawrence 举了一个例子来说明它们的蜘蛛工作速度有多快。在最初建立的系统中，他们用了多个蜘蛛，通常是三个同时使用，每个蜘蛛能够保证一次在一个打开的网页上记录下 300 个链接。最好性能下，在用四个蜘蛛的时候，它们的系统能在每秒搜索超过 100 个网页，生成大约 600KB 的数据。

保证其快速运行，则意味着需要建立一个为蜘蛛提供必要信息的系统。早期的 Google 系统有一个服务器专门来为蜘蛛提供地址信息。为了将时间延迟减少到最低，Google 使用自己的域名服务器（DNS）而不是网络上提供的服务器，DND 的作用是将服务器名翻译为地址。

当 Google 蜘蛛在一个网页上搜索时，它做两个标记：

- 这个网页上的关键字。
- 这个词是在哪里出现的。

出现在标题、副标题、元标签和其他一些相关的重要位置的词被特殊标记，提供给用户作为辅助搜索。Google 的蜘蛛把网页上每个重要的词建立列表，忽略那些文章里的“a”、“an”、“the”之类的冠词。其他的蜘蛛则采取不同的方法。

这些不同的方法通常是要使蜘蛛运行得快一些，或者搜寻到的信息更为有效，或者两者皆是。比如，有的蜘蛛将出现在标题、副标题、链接上的词，以及这个网页上最常用的 100 个词和文章前 20 行的每个词都保存下来。

一旦蜘蛛完成了在网络上搜寻信息的工作，我们应该注意到实际上这个工作是不可能真正完成的——网络上的内容是在不断变化的，这意味着蜘蛛也将不停地搜索，搜索引擎必须以某种方式储存信息以保证它的有效性。为了让用户能得到所搜寻到的数据，需要解决两个关键问题：

- 储存在数据上的信息。
- 信息被检索的方法。

最简单的情况下，搜索引擎只需将所搜寻到的关键字以及它所在的地址保存下来。实际上，这样的搜索引擎用处不大。因为无从得知这个关键字在这个网页上是重要的还是微不足道的内容，这个关键字出现了几次，这个网页上有没有包含这个关键字的其他网页的链接。换句话说，也就无法将所得到的结果按最符合用户需要的顺序来排列。

为了让结果更有用，大多搜索引擎都不只储存关键字和地址。一个引擎可能会存储关键字在网页中的出现次数。引擎将根据每个条目在文中的位置分配权重，看它是出现在文档前面、副标题中、连接中、元标签中还是在网页的标题中。每个商业搜索引擎都有不同的规则来制定出现在索引中的关键字的重要性。这也是在不同的搜索引擎上搜索同一个关键字，得到的列表网页的排列顺序不同的原因之一。

不管搜索引擎将额外的信息块联结得如何紧密，数据都要被编码以节省存储空间。比如 Google 就是用 2 个字节来存储额外信息——如大小写、字体大小、位置和其他一些用来帮助排序的信息。在两个字节中，每个因素占 2~3 位。这样，大量的信息就可以被很紧凑地存储。当信息被压缩好后，就可以建立索引了。索引只有一个目的：让信息被尽可能快地找到。

搜索引擎研究的领域之一就是“基于概念”的搜索。这些研究中有一些用统计学来分析包含你所查询的单词或短语的网页，以此来找到其他一些你可能感兴趣的网页。显然，对于“基于概念”的搜索引擎来说，关于每个页面所存储的信息量更大了，对每个搜索所进行的处理也更多了。尽管如此，还是有许多团队致力于改进这类搜索引擎的结果和性能。其他一些团队则致力于另一个称为“自然语言查询”的研究领域。如今最流行的自然语言查询网站是AskJeeves.com。它记录关键字的查询，将其用于它所建立网站的索引。它只能查询一些简单的条件，如果要做一个能处理复杂查询的自然语言查询的搜索引擎，挑战还是很大的。

阅读材料

网 络 管 理

管理复杂的网络是多数机构所面临的一个挑战。良好的管理提供高质量的服务、高有效性并且能控制其费用（包括人员、设备和产品的升级）。

网络管理的任务可分成战术上和战略上两类。战术上的任务是与对当前的状态如故障、拥塞和不好的服务质量做出响应有关。这些任务包括故障的解决、配置和调整流量。战略上的任务则是从长远的观点出发，是面向制定合理的计划以避免网络的增长而出现不足。另外，战略上的任务还包括用信息调整运作、优化质量和管理设备以降低总的运作费用。

大多数网络管理设计的框架是以开放系统互连模型（OSI）为中心的。网络管理的功能领域包括：用户管理、资源管理、配置管理、性能管理以及故障管理与安全。

用户管理——账户管理和费用管理

账户管理的功能是记录用户信息——用户名、用户域、用户权限、口令和口令确认。其他账户的合理化管理是作为特殊功能服务并且由系统管理员管理。费用管理是对目标管理的可靠性、可操作性和可维护性的进行管理。这项功能使得设备升级、删除无用的服务和把某台服务器性能调到另一台成为可能。通过持续地记录维护费用，与网络系统维护相关的费用是可调配的。

资源管理——系统管理与功能域管理

系统管理是对网络提供服务的管理和执行。资源管理就是实现和支持网络资源。良好的系统管理会有巨大的能力，能合理处理事务并且为用户省钱和减少工作量。这些产品能很容易地集成到网络管理系统中。功能域管理是对企业网络管理系统在地方功能域管理方面的一部分。

配置管理

配置管理大概是网络管理中最重要的一部分，在这里你只有对网络进行配置管理，才有可能准确地管理网络。从网络中进行变更、增加和删除必须与网管系统人员配合起来。配置的动态更新需要定期完成，以保证时刻知道配置情况。

性能管理

性能是牵涉 MIS 管理信息系统的关键。性能管理就是监视和跟踪网络活动，以保证系统的性能。广域网的连接性能、电话主干线的利用等都是应该再关注的方面。

维护——安全与故障管理

大多数网络管理应用软件仅是把安全加到网络的硬件方面上，如某人登录到路由器或网桥。一些网络管理系统具有报警检测和报告能力作为物理安全的一部分（接触关闭、火警报告界面等）。

故障管理是对网络问题的检测、故障分离并恢复到正常运行状态。大多数系统对管理目标搜索以判断故障条件，并对错误问题以图表的格式或文本信息形式表述出来。这些信息绝大多数是系统配置人员在网络管理系统中设置的。当问题发生时，网管系统直接从报警器的记录中获取信息。故障管理更通常地是处理发生在网络上的事件和陷阱。

4.3 无线网络

课文

只有几年的时间，无线局域网已从一个新颖事物发展到彻底改变许多组织连接它们计算机的方法。现在去任何较大的百货商店、医院或办公大楼，都会遇到在所有 PC 和安装在天花板上的接入点中的 802.11 网卡。无线网络变得流行的这种速度并不令人惊奇，因为 802.11b 提供高达 11Mbps 的带宽，以及几百英尺的覆盖范围。更新的标准，例如 802.11g，承诺有上述速度的 5 倍（54Mbps）。多个无线接入点可以很容易地安装在同一个网络上，以扩大可达范围，因此整个大楼很容易被连接。相反，用以太网对大楼布线是昂贵的，并且限制了联网计算机的位置。

无线设备供应商面临着应用的挑战，这些应用要求支持的带宽越来越大，如 IP 电话、流式视频和视频会议等。为了显著提高总处理能力，802.11a 的支持者必须解决室内射频这一重大挑战。他们必须开发出一种方法，解决目前 2.4GHz 单载波延迟扩展系统的延迟扩展问题。

延迟扩展是由被发射的射频的反射引起的。在这些信号到达某一点（如无线天线）的过程中，它们常常因物体、墙壁、家具和地板等而产生反射，由于路径长度不同，信号到达天线的时间也不同。故需要基带处理器或均衡器，“拆分”有歧义的射频信号。延迟扩展必须小于符号速率，或小于为传输而进行的数据编码的速率。如果不是这样，有些延迟的信号会扩散到下一个符号的传输中。这就给能被持续获得的最大位速率加了个上限。

在采用目前位速率技术的情况下，这个上限往往会在 10Mbps~20Mbps 之间。802.11a 标准通过一种称为正交频分多址（COFDM）的创新的调制技术，巧妙地解决了这个挑战，COFDM 早已用于欧洲的数字电视和音频的传输。

COFDM 通过下列两种方法突破了数据位速率的上限：（1）以大规模并行的方式发送数据；（2）放慢符号速率，致使每个符号的传输比典型的延迟扩展长得多。为了让所有的延迟信号在基带处理器对数据解调之前“确定下来”，在符号传输的起始处插入保护间隔（有时也叫周期前缀）。

无线设备供应商现在的目标是将无线总处理能力提高到 100Mbps 以上。802.11a 标准目前最高能在带宽为 20MHz 的信道上达到 54Mbps，但已有几家公司正在开发和建议 802.11a 标准的高速扩展。这些建议一般都是设想把总处理能力至少提高一倍，达到 108Mbps~155Mbps 之间的某个值。

现在购买的大多数新的便携计算机都配有内置的 802.11 联网能力，而配置一个家庭或办

公室无线网络只需不到 10 分钟。此外，PC 网卡价格正在迅速下降，而功能却在增强，影响无线联网的经济因素只有通过给用户方便来解决。

802.11 的广泛接受是必然的，并且普遍预期它只会增加。最终，很可能大多数公共场所将提供某种类型的无线连接；人们积极地把范围扩大到飞机和火车，以及购物商品区和机场。

IEEE 802.11 无线局域网是一组位于有限的物理区域内的工作站（无线网络节点）。在该区域内，每个工作站具有与基站进行无线电通信的能力。有两种 WLAN 设计结构：专用网络和基于架构的网络。安装的绝大多数使用基于架构的 WLAN。

专用 WLAN 若不用另外的路由协议，就没有能力与外部网络通信。建立一个专用 WLAN 通常允许多个无线工作站彼此能直接通信，而需要最小的硬件和管理。

基于架构的 WLAN 由一个或多个基本服务组（BSS）组成。每个工作站有一个 BSS 把它连接到该架构，即允许访问外部网络的分布系统（DS）。工作站到 DS 的连接点，称做接入点（AP），负责把从该 BSS 中的工作站来的包转播到 DS。

红外技术

红外技术作为一种在办公室 PC 之间，或办公室 PC 与手持设备或打印机之间建立无线连接的方法，最近几年已获得流行。红外技术以红外光线发送数据。如同你的红外电视遥控那样，红外技术需要瞄准传输。因为这个限制，许多以前的红外设备（如无线鼠标和键盘）现在都使用无线电技术。

某些仍使用红外技术的应用包括从手持 PC、笔记本电脑、数码相机或其他设备发送数据给台式计算机，从便携式 PC 发送文档给打印机，以及连接便携式 PC 到公司网络。

蓝牙技术

蓝牙标准是手持 PC、移动电话和其他便携式设备之间低成本、短距离的无线电通信的解决方案，也是这些设备连接到家里和企业里 PC、电话、打印机等设备的无线电通信的解决方案。蓝牙无线技术使有蓝牙功能的设备（包含专用的蓝牙无线电收发器芯片）之间传输实时声音和数据很方便，例如，蓝牙耳塞或头戴式耳机能够与放在口袋或包里的手机一起使用，或者当你走进办公室时，你的 PDA 设备立刻能与台式 PC 同步。因为当诸多蓝牙设备到达传输范围内时（无放大器大约 10 米），它们能互相自动认识，所以手持 PC、手机和其他便携式设备当它们在该范围内总是能无线联网。一些工业专家预言，未来所有家用电器都将是有蓝牙功能的，自动联网的智能家庭将诞生。

无线以太网

无线以太网允许以太网标准用于无线网连接。它也称为 Wi-Fi，虽然从技术上讲，标签 Wi-Fi 只能用于由无线以太网兼容性联盟认可的无线以太网产品。Wi-Fi 认可产品的用户获得保证，他们的硬件将与所有其他认可产品兼容。

IEEE 802.11 标准扩充了以太网技术所用的载波侦听多路存取原理以适于无线通信特性。802.11 打算支持相应位于大约 150 米以内的计算机之间以最高速度 54 Mbps 通信。无线以太网对那些希望扩充它们的有线以太网的组织是一种正在增长的选择。

阅读材料

超宽带无线技术

说到无线通信和联网技术时，肯定不乏选择。目前已有多种无线上网形式，如手机、3G、Wi-Fi、WiMax、蓝牙、电力线和 802.11a、b、g 和 n，你可能会认为其他技术没有了发展余地。但技术仍在大踏步前进，在今后几年，我们将看到一种新的、不同的无线技术。

这个无线电领域中的新东西就是超宽带，也称为 UWB 或数字脉冲无线。它有助于在无线技术装备起来的家庭和办公室中传送电视节目、电影、游戏和百万兆字节的数据文件。UWB 比目前的无线局域网技术速度更快，提供了一种无干扰的短距离、高带宽管道。

UWB 也是扩频无线电（也称跳频）技术的继承者，扩频无线电技术是一项第二次世界大战时期的技术，该技术将广播分散到不同的无线电频率上，每次只用一个频率，以避免干扰。而 UWB 在同一时间使用所有可用的频率。

UWB 不是直接替代其他形式的无线通信，但它做了一些其他技术无法与之匹敌的事情。UWB 发射机在一个很宽的无线电频率上发送几十亿个短脉冲。这些射频脉冲非常快——只延续万亿分之一秒到几纳秒，每个脉冲实际上只用了射频载波的几个周期。

这样短的持续时间给予 UWB 波形一些特别的属性。相对而言，它们不受多路径消除效应的影响，例如，当强反射波与直接路径信号不同相位时，降低了接收机中的信号强度。UWB 脉冲如此短，以至于在反射路径信号到达之前直接路径信号已经收到和送出，所以不会相互抵消。由于 UWB 脉冲非常短，所以它们可以使用极宽的频谱，这就允许信号使用极低的功率，就将无线电频率之间的干扰降至最低，降低了对人的健康危害，而且常常低于常态的噪声水平，因此使之很难被探测到。

从技术上讲，UWB 可以定义成任何一种占据频谱超过中心频率 20%或者带宽至少为 500MHz 的无线技术。为了占据非常宽的带宽，现代的 UWB 系统使用不同的调制技术，其中包括正交频分多路复用。

在目前的开发状态下，UWB 旨在提供个人区域网中的高数据传输率，它的有效范围大致在 10 米或更短一些的半径内。虽然它与蓝牙当前的能力相近，但它采用完全不同的技术。UWB 发射是以带宽换距离，距离越长，最终的数据率就越低。利用高增益天线和降低性能，可以把距离延长到一公里。

UWB 的显著特点之一就是要求极低的电功率——有消息称它的使用功率只有手机的 0.001%，所以常规的无线电设备实际上是检测不到 UWB 的，因为它把 UWB 看成极低的背景噪音。因此，UWB 电话使用极小的功率，不需要充电就可以使用数周。由于 UWB 使用可利用的所有频谱，所以它比设计和制造需要仔细调谐到指定频率的常规无线电设备更便宜。

UWB 发射机和接收机必须紧密配合和同步，以便发送和接收精度为万亿分之一秒的脉冲。接收机只响应熟悉的脉冲序列。UWB 产品除了无线电设备外还包括雷达和电子定位设备。UWB 雷达可以穿透墙壁、天花板和地板，而其他类型的无线电信号会被这些东西挡住或反射。作为一项电子测量技术，UWB 比全球定位系统卫星更精确，它可以在室内使用。最终，UWB 网络有望运行在高达每秒千兆位的速度上，因此能处理所有的电话、电视及家庭和小公司的互联网流量。

4.4 网络安全

课文

当把一个可信赖的网络与一个不可信赖的网络连接在一起时，将牵涉到对可信赖网络的安全负责者。关注与互联网的连接，可能大部分基于从普遍的媒体报道安全突破口收集的轶事类的证据。然而，进一步探索媒体报道背后的事实和统计，将会深化这种关注。例如，美国国家计算机安全机构声称，许多对计算机系统的攻击未被发现并报告，美国国防信息系统机构称，美国国防部 9000 台计算机遭到攻击。这些攻击有 88%获得成功，有 95%未被目标机构检测到。只有 5%中的 5%察觉了攻击，只有 22 个站点对攻击进行了反抗。

尽管对安全问题有所恐惧，还是会有越来越多的机构跻身于互联网作为它们战略计划的一个重要组成部分。将来不会由于对安全的忧虑而阻止许多机构去发掘互联网上所提供的商机。最终，公司将不得不找出办法来管理安全问题。这使得互联网安全市场的成长直接与互联网的成长绑在一起。受互联网和内部网发展的带动，1995 年到 2000 年，互联网防火墙市场的年混合增长率计划达到 174%。 驱动这种增长的最主要的动力来自 WWW 服务器在互联网和内联网上的快速而广泛的配置。Web 服务器软件的单位出货量预计将从 1995 年的 12700 份增加到 2000 年的超过 500 万份。尽管 IT 业一向以高速成长而自豪，这样的增长水平还是前所未有的。

加密技术

加密是解决数据安全问题的途径。加密技术有两种——对称密钥加密和非对称密钥加密。

对称密钥加密，当事人双方要有一致的密钥。当 A 给 B 要发送消息时，A 用密钥将消息加密，B 收到加密的消息后，用相同的（或最初的）密钥将消息解密。用对称密钥加密的优点在于它的加密和解密速度快（与相同安全标准下的非对称密钥加密术相比）。它的缺点是：第一，在发送加密信息之前，当事双方必须安全地交换密钥；第二，对不同当事人，我们必须使用不同的密钥。例如，如果 A 和 B、C、D 及 E 通信，A 必须用四种不同的密钥。否则，B 将知道 A 和 C 以及 A 和 D 在谈论什么。要找到安全交换密钥的方式很困难，所以，对称密钥加密的缺点使它不适合用于互联网。

对非对称密钥加密，当事各方都有一对密钥：一个公钥和一个私钥。公钥可自由使用，但只有密钥持有者拥有私钥。用公钥加密的消息只能用相应的私钥解密，反之亦然。当 A 给 B 发送消息时，A 首先得到 B 的公钥将消息加密，然后发送给 B。B 收到消息后，用他的私钥将消息解密。这种加密术的优点是人们可以自由获得公钥，因此从交换密钥问题中解脱出来。它的缺点是加密和解密速度慢。在互联网中几乎所有的加密方案都使用非对称密钥加密来替换对称加密密钥和对称加密，以得到更好的性能。非对称密钥加密在数据传输上似乎是安全的，但认证的问题仍然存在。请考虑如下情节：当 A 给 B 发送消息时，A 从互联网上得到 B 的公钥——A 怎样才能知道他获得的公钥确实属于 B？这个问题由数字证书来解决。

认证

数字证书相当于电脑世界的身份证。当一个人想获得数字证书时，他生成自己的一对密钥，把公钥和其他的鉴定证据送达证书授权机构，证书授权机构将核实这个人的证明，来确定申请人的身份。如果申请人确如自己所声称的，证书授权机构将授予带有申请人姓名、电子邮件地址和申请人公钥的数字证书，并且该数字证书由证书授权机构用其私有密钥作了数字签名。当

A 要给 B 发送消息时，A 必须得到 B 的数字证书，而非 B 的公钥。A 首先核实带有证书授权机构公钥的签名，以确定是否为可信赖的证书。然后，A 从证书上获得 B 的公钥，并利用公钥将消息加密后送给 B。

认证是日常生活中的重要部分。缺少强有力的认证制约了电子商务的发展。写在纸上的合同、法律文件和官方信函仍是必要的。如果互联网用于电子商务，强有力的认证是一个关键要求。强有力的认证通常是建立在现代版的一次性密码本技术上的。例如，令牌用来代替昔日的一次性密码本，而且储存在智能卡或磁盘上。

防火墙

自从互联网问世以及出现了计算机网络安全问题，很多人都在寻找防火墙。“黑客”和“解密高手”的经常性威胁受到前所未有的重视。为了满足在互联网上安全进行电子商务的商业需要，有必要引导企业构建完善的防火墙。已经建立了很多软件和硬件装置来共同保护珍贵的关键数据免遭破坏。一些公司投入大量的资金、时间、物力和人力来建立防火墙系统以确保他们免遭侵犯。

使用防火墙就是为了在内部网络（内联网）与互联网之间提供隔离层。防火墙简单地说就是一组构件，可共同在两个网络之间构成一个屏障。

防火墙是将一个网络连接另一个网络的安全系统。这套安全装置有一对计算机主板，每块主板上都有一个或多个网络用户接口适配器，用于从一个计算机网络到另一个计算机网络间接收和传送通信信息。防火墙被专门设计成一个安全系统，以阻止在一个网络与另一个网络间的未被授权的通信，更多的是专门用来阻止那些未被授权的在公众网（如互联网）上的用户去访问个人的专用网。防火墙能够在现行的和未来的网络操作系统上运作，也能在现在和最新开发的客户操作系统上运作。

阅读材料

计算机安全

硬件、软件和数据是计算机系统的主要资源，计算机安全与这些相关。假如蓄意破坏硬件设备、抹除程序或数据文件，以及操作系统文件管理器出故障，都会导致不能找到某一磁盘文件。另外有截取——即非授权用户访问系统资源。也有程序或数据文件的非法复制，或私自接线入网去截获数据。数据丢失可能会很快被发现，但截获者也可能不留下任何容易检查的痕迹。非法用户不仅可以访问计算机资源，还可以篡改资源。某人可以修改数据库中的值，更换一个程序，以便完成另外的计算，或修改正在传送的数据，甚至还可能修改硬件。某些情况下可以用简单测量手段检测出所做的修改，但有些微妙的修改几乎不可能检测出来。入侵者妄图向网络通信系统加入虚假的事务，或向现有的数据库追加记录。这是非法用户的伪造。

计算机安全已经成为急需解决的问题。计算机拥有者必须采取措施防止偷窃和非法使用他们的设备。应该要求计算机用户提供正确的身份标识，而且对计算机的访问应该进行控制。

现在，大多数计算机设备都有某种安全系统。这些设备都具有确认使用系统的用户身份的能力，从而可使非法用户无法对系统进行访问。一般情况下，合法用户都发有特殊的使用卡、钥匙、口令或账号。在小学和中学里，该身份确认系统可能是一份简单的名单。该名单上的每个人都发给一个上锁的计算机机房的钥匙。不幸的是，有些用户把自己的钥匙和口令都借给别

人使用。通常，让计算机用户选择他们的口令时，他们经常会选择一些容易记忆和猜测的口令。

避免这些问题的一种方法是指定访问代码，该代码可以由计算机通过读通行卡得到。用户不需要记住自己的访问代码，因此该代码可以很复杂。即使通行卡被盗，挂失后代码就能被修改。

另一个安全问题涉及对计算机操作系统和数据的保护。采用安全措施保护所有的操作系统是很必要的。一些无所不为的人已经有办法避开安全系统打印出用户口令列表，给自己授予访问系统的权利。这些人未被正式授权，并且在系统中传播病毒。由于这些原因，所有敏感数据在不使用时都需要妥善保存。有些大公司以加密码的方式对数据进行存储，因此，如果没有一个称为密钥的特殊数据项的话，这些经过加密的数据对任何人都是无意义的。

计算机病毒是一串代码，它会破坏或删除机器中的信息、文件或软件程序。计算机病毒是一种程序，它侵入其他程序，并通过修改其他程序而将自身（也可能是自身的变形）的复制品嵌入其中。正如感染人体的病毒一样，计算机病毒会传播。当从互联网上下载，或从磁盘上复制一个被感染的文件时，计算机就会染上病毒。一旦病毒进入计算机文件，马上就会破坏或摧毁信息，或者等到某个特殊的日期或事件的到来临时才触发其破坏活动。

一些病毒是由文件感染型病毒组成的，它们将自身依附在普通的程序文件上。这些病毒通常感染任意的.COM 和/或.EXE 文件，尽管有些也感染任何具有执行功能的文件，如.SYS，.OVL，.PRG 和.MNU 文件。还有一些病毒是系统病毒或引导区记录感染型病毒，这些感染可以执行代码的病毒出现在磁盘的某些不是普通文件的系统区中。

第 5 单元　电子商务知识

5.1　电子商务

课文

电子商务就是利用电子媒介做生意。它意味着利用简单、快速和低成本的电子通信实现交易，无须交易双方见面。

高速的计算机网络使地理上的距离变得微不足道。商人可以销售商品给非传统市场上的客户，开发新的市场及发现商业机会更容易。通过在互联网上全天候地提供产品及服务的最新信息，商家可以与客户和消费者随时建立紧密联系来确保他们的竞争优势。互联网在网络世界为公司提供了大量的市场和产品推销机会，同时也使他们与顾客加强了联系。利用多媒体技术，可在互联网上非常容易地建立起企业形象、产品、服务品牌名称。

电子商务的定义

不同的学者对于电子商务有不同的定义。

Marilyn Greentein 和 Todd M. Feinman 将电子商务定义为：电子传输媒体（电子通信）在产品和服务买卖交换中的使用，这些产品或服务需要从一个地方到另一个地方的运输，其中运输包括人力运输和数字传输。

Kalakota 和 Whinston（1997）从以下角度定义电子商务：

从通信的角度看，电子商务是指通过电话、计算机网络或者其他电子手段来传递信息、产

品/服务或者支付。

从商务活动的流程来看，电子商务是指将商业交易及工作流程自动化的技术应用。

从服务的角度来看，电子商务是一种用来满足厂商及消费者的需要，设法降低服务和管理成本，提高产品质量和加快服务速度的工具。

从在线的角度来看，电子商务能够实现在互联网上买卖产品和信息以及其他网上服务。

IBM 的总裁 Lou Gerstner 说：“电子商务和许多事情有关，包括商业周期、速度、全球化、生产力增加，获得新的客户，以及跨机构进行知识分享以获得竞争优势，等等。”

电子商务领域的专家李琪教授从生产力的角度来定义电子商务。他认为应该从两方面来下定义，广义的电子商务是指利用电子通信工具来进行商务活动。狭义的电子商务是指在技术和经济高度发达的社会，那些掌握信息技术和商务规则及法规的人们利用电子工具，系统地、有效率地、低成本地参与到各种以交换商品和服务为中心的整个过程。第一个定义可以简称为商务化的电子应用，第二个定义可简称为电子商务系统。

根据交易的性质对电子商务分类

电子商务一般按照其交易性质分类，可分为以下类型。

企业对企业的电子商务（B2B）。今天大多数电子商务都属于这一类，它是组织间的电子市场交易。

企业对个人的电子商务（B2C）。它主要是与个体顾客进行的零售交易。亚马逊网站最典型的顾客就是它的消费者或者客户。

消费者对消费者的电子商务（C2C）。这类电子商务是指消费者直接销售给消费者。如个人在分类广告网站发布广告以及销售个人房屋资产、轿车等。个人对个人的电子商务另一个例子就是在互联网上发布个人服务广告和将知识及专家经验作为商品出售。许多拍卖网站也允许个体提供项目来进行拍卖。于是，许多人利用企业内部互联网和其他组织的内部网站来发布销售或服务的广告。

个人对企业的电子商务（C2B）。这一类包括个人向组织推销产品或服务，以及个人寻找卖家、与卖家互动，并最终达成交易。

电子商务网络安全

电子商务网络安全受到来自各方面的威胁。由于来自互联网及黑客截取、滥用、篡改信息内容的威胁，安全漏洞被频繁地讨论。其实，互联网只是不安全性的潜在来源之一，电子商务网络安全问题还有如下一些其他的来源。

客户方：在使用或未使用客户设备的情况下，他人可以冒充客户方。使用盗取的信用卡详细资料就是最简单的例子。

卖方：卖方可以进行不适当或不诚实的交易。这类问题包括卖方文档中的客户详细资料被盗取，以及设立网上商店却不提供广告上的商品或服务来骗钱的虚假交易者。

电子商务安全问题（网络整体的及通信两端的）可以分为如下 4 种。

1．私密性

当通过电子手段传输信息时，发送者和接收者都希望所传输的信息是保密的，也就是没有被任何第三者看到。因此除了指定的接收者之外，传输的信息必须是无法解读的，这样才能赋予电子信息的私密性。

2．身份真实性

在系统或用户收到一条电子信息时，发送者的身份必须能够得到验证，以确保发送者身份的可靠性。一般而言，要验证一个用户，以下各种信息至少需要一种：你所拥有的东西（如令牌）、你所知道的东西（如个人身份证号码）或者你是什么（如指纹或签名）。

3．完整性

如果信息没有被以任何方式有意或无意地改变，我们就说它保持完整性。对电子商务而言，鉴别购买者发送的订单细节没有被改变是一个主要的安全问题。在电子交易过程中，交易伙伴双方通过电子手段共享的设计规格说明书需要确保没有被以任何方式改变，无论是客户发给供应者的，还是供应者发给客户的。

4．不可抵赖性

在涉及到应还债务时，因为有人拒绝承认债务的存在，术语“抵赖”就意味着拒绝接受享受的权利和应承担的义务。对电子交易而言，任何一方对交易的单边否认都是令人不可接受的，并有可能导致诉讼案件。设计优良的电子商务系统会提供防止抵赖的方法，也就是提供不可反驳的原始证据、收据和电子信息的内容。从事电子商务的企业常易遭受不可抵赖危险的攻击。

电子商务的法律问题

由于电子商务是一门新兴学科，电子商务的发展所必需的法律、伦理道德及其他公共政策等方面的问题正在日趋完善之中，所以许多法律漏洞只有在相关事件发生后才能被填补上。

由于网上交易要遵守相关法律，这就使得它面临着两个越来越复杂的因素。首先，网络使企业延伸到了传统边界之外。使用了网络的交易马上就变成了国际交易，因此，这样的一个企业就比基于具体地理位置的传统实体企业要更快地遵守更多的法律。其次，网络提高了商业通信的速度和效率。与传统商家相比，客户通常与网络商家有着更为频繁的互动和复杂的关系。此外，互联网在与彼此之间经常有着高水平互动的客户间建立了一张关系网络。一旦网络交易违反了法律或者道德准则就会面临来自许多客户的迅速而强烈的反应，并且其他的交易者也会留意这一交易活动。

我们把和电子商务相关的法律问题分为以下 5 种：

隐私问题：这一问题对消费者来说是最为重要的。其实，在如今大多数与电子商务相关的大的网站上都可以见到隐私声明。

知识产权：由于复制和散播数字信息非常容易且成本低廉，保护网络知识产权极为困难。此外，监视谁在使用这些知识产权和如何使用也是非常困难的。

言论自由权：网络提供了历史上从未有过的言论自由的机会，但是，这种自由或许会侵犯一些人的权利。并且，非法和不道德的界限也并不是始终是清晰的。

税收：现在，对网上交易征收新的销售税是困难的，不同国家间的税法可能发生冲突。

消费者保护：如今有许多法律可以用来处理与电子交易相关的消费者保护问题，从误传到各种各样的诈骗。

阅读材料

信任在电子商务成功中的作用

电子商务的成功很大程度上可以归因于两个因素：一是人们在在线商务上建立的信任关

系；二是他们在网上进行商业交易时感受到的安全程度。一般，人们需要经历很长一段时间才能建立起信任关系。现实世界中，人们是通过对公司组织的观察和第三方的介绍来获得信任的。信任可产生再交易，而这是取得成功的一个必要因素。安全是所有的公司都想努力提供的。

信任不易衡量，它需要时间来获得发展。人们信任某一交易是基于他们过去的经验或第三方推荐。在网上商业世界中，有助于提升信任的重要因素是：

- 对产品或服务的描述信息访问的难易程度；
- 下订单的难易度；
- 订单确认；
- 订单跟踪；
- 售后服务。

这些属性支持着目前关于信任的定义。因此在顾客对交易产生信任感以前我们必须要让他们在以上的每一方面都有良好感受。所有的电子商务公司必须通过各种途径来促进顾客信任机制的建立。

公司产品和服务如果是一个树状结构的设计，那么就便于顾客浏览。就网页设计来说，有许多可利用的工具可以使网页变得有吸引力也便于顾客浏览。通过使用数据库工具，公司很容易获得实时网上数据，例如当前（访问者）数量。

目前有些第三方销售商提供网上购物车设施。现在的技术可使订单确认变得很方便。目前最常用的方式是通过电子邮件。因为发货信息的送货是通过一个独立的载体，所以大多数时候订单跟踪信息是稍后传来的。但是只要把订单跟踪信息与订单历史纪录链接起来，问题就迎刃而解了。最好当然是由送货方来全面处理订单跟踪信息。为了成功建立信任，公司需要和送货方合作共享信息。

售后服务在赢得顾客忠诚和信任方面上发挥着重要作用。电子商务中，顾客很有可能离销售方很远，但同时他们又可以二十四小时登录销售方的网站。这种时间不对称使得电子商务公司必须依赖自身的信息系统来促进售后服务，例如商品的退还。在这一过程中产生的任何瓶颈都将成为一个失去顾客信任的主要因素。

许多顾客不了解网上商务。但是，他们非常有兴趣和网上公司进行交易，因为所提供的产品或服务对他们具有有益的方面。他们主要是对这种商务缺乏了解。另一方面，顾客们非常信任大的金融机构。所以他们利用金融机构的中介作用来作为对商户支付的保障，同时向客户保证他们的满意是至高无上的。金融机构例如“第一虚拟”公司从顾客收取订单的金额并按照签订的合同负责保管一定的时间。卖方通常对买方先支付感到满意。顾客也是对这点感到满意，因为如果他们所订购的商品与所预期的不一致，他们有一个可靠的中间人可以协助调解。

担任中间人的职责在于解决冲突和实现顾客满意。而为了起到他们的中介作用，他们必须建设必要的信息基本设施。他们通过其他可信赖的机构来与顾客结识，这些机构，如商业服务监督局，授权给他们印章。

5.2 电子数据交换

课文

电子数据交换（EDI）被众多组织用于以事先决定好的格式所发生的普通交易。EDI 通常

被用在整个贸易的实施和结算阶段。在执行一个简单的贸易中，客户的订单可以用 EDI 发送，供应商的递送通知也可以是电子的。至于结算，供应商可以使用 EDI 来传输发票，客户可以在银行通过对供应商的付款通知和使用电子转账完成最后的环节。这整个周期可能会更为复杂，并且包含更多的电子信息。

更正式的对 EDI 的描述是：依照计算机系统间的协议标准、用电子手段进行结构数据的交换。结构数据就等同于文件数据内容的明确表示方法，如票据、订单和其他文件类型。用计算机系统确保信息正确互通的方法是制定标准。纯粹的 EDI 背景下的电子信息交换意味着无人为干涉。

在理论上，贸易伙伴间可以从一台计算机到另一台计算机直接完成 EDI 操作。实际上，EDI 可以更容易通过被称为增值网络（VAN）的中间媒介来完成。VAN 作为电子交换所或邮局，在贸易伙伴间进行信息的传送，并在接收者准备好之前存储信息。

EDI 信息，被称做是一组事务处理的规范，它是由 EDI 组织的成员——通常是商家制定的一系列格式。每个行业都根据需要制定一套要求规范。例如，健康保险业根据病人的记录和保险要求按规范进行事务处理。美国的 EDI 标准 ANSI X12，按各行业制定了几百条规范要求。

EDI 对硬件的要求

EDI 确实要用到计算机和网络。要想知道都是哪些类型的计算机可能有些困难。但 EDI 在 PC 上可进行，在大型机也可进行，不管你的贸易伙伴用的是哪类机器，EDI 都是可进行的，因为 EDI 的硬件是独立的，EDI 的标准已考虑到了这点。然而你所选择的硬件可决定 EDI 的集成、实施，对你现在或将来能否正常工作都有影响。

你极可能会通过电话线用调制解调器进行 EDI 业务传送，购买尽可能高速的调制解调器，以符合你的最大利益，它是用速率来衡量的，即每秒调制解调器传送的字符数。你应该考虑到这点，即使它的速率超过 VAN 或某地区电话公司的速率。假使传输的速度比接收的快，也很可能提高竞争力，增长能力。从长远来看，买一个调制解调器而不是两个可以省钱。若你计划用整晚来传送业务文档以克服低速，则调制解调器的速度低也就不是问题了。也要考虑人力资源的利用，谁来负责本系统？若你是用大型机的用户，则会用它们来进行 EDI，以避免去重新培训，尽管软件和通信方面的费用会明显高于以 PC 为基础的解决方案。

EDI 对软件的要求

翻译软件是与 EDI 相关的两个主要软件之一，并且是其中更重要的一个，没有翻译软件就没有 EDI。在发送端，翻译软件将原始数据重组成 X12 标准格式。EDI 业务发送者一般不需要将所需传送的文件转换，而是由翻译软件将现有的数据转换成 EDI 规范的格式。在接收端，这一过程是反过来的，接收器从 EDI 的传送中汲取所需的信息再把它们放入自己的应用软件，这是标准化如此重要的原因之一。让翻译软件知道需要什么样的信息、到哪里去找及如何处理。有一些 VAN 提供这种翻译软件作为他们服务的一部分，而其他则没有。

映射软件是 EDI 软件中的另一个主要部分。它是在公司的 EDI 事务与其他应用间进行信息交换，比如像账务、资产和订单。许多人发现映射是 EDI 的“硬”部分，因为它需要相当的技能和耐心在不同的应用间成功地映射数据。映射使 EDI 成为一个强大的工具，因为它让数据自由地、精确地和自动地交流。映射真正让商业利用 EDI 的能力，以符合他们的利益。

EDI 的优势

EDI 可以为使用它的组织带来不少好处。它可以在商业交易中节省大量的时间，而且在节约成本方面大有潜力。

1．缩短订购时间

纸质订单需要打印、装信封，并且由客户的邮递室通过邮政服务来发送，由供应商的邮递室接收并输入供应商的订单处理系统中。如果在三天之内能够可靠地实现这一过程就很不错了。EDI 订单直接送入网络，而唯一的延迟就是看供应商多长时间从系统中检索信息。订单可以在一天内进入供应商的系统，如果有紧急信息，则可以更频繁地被检索，比如每个小时检索一次。

2．削减成本

使用 EDI 可以削减成本。这包括信笺的费用和邮资，但是这些或许会完全与运营 EDI 系统的费用相抵消。使用 EDI 主要的节约是在它节省人力成本的潜能方面。一个很明显的例子是，如果订单直接输入系统则不需要订单输入人员。再者，季节性高峰期、员工节假日等不再造成在订单输入区的积压。节约成本需要用来充抵建立系统和网络的成本。

3．消除错误

将任何信息输入计算机系统都可能发生错误，把纸质的订单输入订单处理系统也不例外。EDI 可以消除这些错误。很危险的事情是，如果没有一个订单输入员可以发现客户的错误，客户将无法得到所有他所要求的。

4．快速反应

使用纸介质的订单，如果有供应困难，如产品脱销，客户需要几天的时间才能得知消息。而使用 EDI 则可以直接通知客户，这样就有时间预定调换产品或换一家供应商。

5．精确地开发票

就像订单一样，发票也可以用电子的方式发送。EDI 发票有着和 EDI 订单一样的优势，它可以节省时间和避免出错。但是，EDI 发票的主要优势是它可以自动与原始订单相匹配，清算付款时不会引起像核对纸质发票所发生的那种质询。

6．EDI 支付

支付也可以用 EDI 来完成。EDI 支付系统也生成 EDI 付款意见，可以以电子的方式与有关发票相匹配，亦可避免疑问和延迟。

使用 EDI 的间接好处包括减少库存量，改善现金流量，开发商机和锁定客户。为了获得 EDI 的这些优势，就必须把它视为一种投资——首先是投资，回收是长期的。投资的成本包括 EDI 系统的建立（硬件、软件和网络设施），以及与贸易伙伴达成协议的时间。

阅读材料

数 字 钱 包

新技术的发展使在互联网上货物交流和提供服务支付费用成为可能。一些方法可以同现在的电子银行和付费系统相联系，包括信用卡和借记卡网络，通过互联网具有新的零售用户界面。基于存储价值、智能卡、还有其他技术之上的“电子货币”也在发展之中。私营企业方面的投资和竞争在紧张的革新时期内蒸蒸日上，这将对希望参与到全球电子商务中去的消费者和商家

有利。

许多组织机构已在从事电子银行和电子支付这方面的重要工作。他们的分析将会让人们更好地理解电子支付系统是怎么回事，并会对全球的电子商务和电子银行产生影响。随着电子支付系统的发展，政府应与私营企业紧密合作，以推动政策的发展，并确保政府行为的灵活性以满足合并市场的需要。

数字钱包是一种能使用户在网上支付货款的软件。它保存信用卡号码和其他个人信息，如送货地址。数据一旦被输入，就自动转移到商家网站的订货域。

使用数字钱包时，当消费者购买物品时，不需要填写每个站点上的订单，因为信息已经存储了，并自动更新和进入到商家网站的订货域。消费者使用数字钱包时也能得到好处，因为它们的信息被加密了，即由私人软件代码加以保护。商家避免了受骗而得到保护，也从中受益。

对消费者来说，数字钱包是免费的，可以相当容易得到。例如，当消费者在建立了服务器端数字钱包的商家网站上购买东西时，他把其名字、付款额和送货信息输入到商家自己的表格中。在购买结束时，他被要求为他选择的钱包签上用户名和今后购买时的口令。用户也能从钱包供应商的站点上得到钱包。

虽然钱包对消费者是免费的，但（钱包）供应商对商家使用钱包要收费。数字钱包分两大类型：客户端和服务器端（数字钱包）。在这些分类中是那些只在某些商家网站上工作的钱包和那些商家不可知的钱包。

基于客户的数字钱包是两种钱包中较陈旧的一种，据分析人士称，这类钱包已开始没人理睬了，因为它们要求用户下载和安装软件。用户需要下载钱包的应用程序并输入付款额和邮寄信息。在这个意义上，信息是安全的，并在用户的硬盘上进行了加密。用户在本地拥有对其信用卡和个人信息的控制。

使用基于服务器的钱包时，用户填写其个人信息，并自动下载 cookie 文件（cookie 文件是一个包括了有关用户信息的文本文件）。在这种情况下，消费者的信息驻留在金融机构或者数字钱包供应商的服务器上，而不是在用户的 PC 上。

服务器端钱包提供了针对商家欺骗的安全措施，因为它们使用证书来验证各方的身份。当一方进行交易时，它向涉及的其他方提交证书。证书附着在电子报文上，用于验证一方的身份，并向接收方提供对回答进行编码的手段。另外，信用卡持有人的敏感信息一般保存在金融机构内，由于金融环境通常提供最高等级的安全性，因而这又是一种额外的安全措施。但是即使钱包提供了方便的网上购物，它还是未被广泛采用。标准化是数字钱包能否成功的关键。

5.3 网络广告方法

课文

做广告就是为了影响买卖双方的交易而进行的信息传播的努力。互联网重新定义了广告的含义。互联网使得消费者能直接与广告商及广告互动。在互动营销中，消费者可以单击他（她）的鼠标来得到更多的广告资料，或发送电子邮件问问题。互联网为广告商提供了双向通信和电子邮件的能力，同时使得广告商把广告费花到他们想针对的特定群体身上，这比传统电话营销更准确。最终互联网实现了真正的一对一广告。

1．为什么互联网上的广告不断增长

公司在互联网上做广告有好几个原因。首先，电视观众正在移向互联网。媒体紧追其后，宣称任何广告商的目标是为了实际而快速地接触目标受众。广告商认识到他们必须调整其销售计划，以适应越来越多的人减少利用其他媒体的时间，越来越多地把时间花在上网这种新情况。从看电视转移为电脑用户的人看来十分壮观。另外，还有个事实就是：互联网用户受过良好教育并拥有高收入。于是，网上冲浪者是广告商所期望的目标这一结论就是唯一合乎逻辑的结论。

网络广告高速增长的其他原因有：

- 广告可以以最少的成本时时更新，因此，它们总是及时的。
- 广告可以送达全球范围内的非常多的潜在买主。
- 有时，在线广告相比于电视、报纸或广播电台而言更便宜。后者更贵，因为后者的费用取决于它们所占用空间、展示的天（次）数，以及登载在多少国家和地方的电视台、报纸上。
- 网上广告可以有效地将文字、声音、图像和动画结合起来使用。
- 互联网本身的发展十分迅速。
- 网上广告可以互动，并针对特定兴趣的人群和个人。

这些特征开始说服大型消费品公司把越来越多的花费在传统媒体上的费用转移到网络广告上来。

2．用于广告的主要方法

（1）旗帜。旗帜广告是互联网上做广告最常用的形式。当畅游在信息高速公路上时，旗帜广告到处都是。图像的文件大小应该是大约 7~10KB。文件越小，加载越快。因为较长的下载时间可能使得浏览者变得没有耐心，或在旗帜广告全部出现之前转移注意力，所以，旗帜广告的设计者在图像大小上付出很多心思。通常，旗帜广告包括一篇简短的文字或所推销的产品的图形信息。广告商尽量设计出能吸引消费者注意力的旗帜广告。

随着互联网编程的进步，我们现在开始看到有视频和音频剪辑的旗帜广告。旗帜广告有一些链接，当单击这些链接时，客户就会看到广告商主页。有两种旗帜广告：关键字旗帜广告和随机旗帜广告。当一个预先确定的词在搜索引擎中被查询时，关键字旗帜广告就会出现。对于想缩小目标观众范围的公司而言，这是非常有效的。随机旗帜广告随机出现。想推出自己的新产品的公司要使用随机旗帜广告。

利用旗帜广告的一个主要优势是能够为目标观众而定制。人们可以决定针对哪个细分市场。旗帜广告甚至可以定制成一对一的目标广告。“强迫广告”营销策略也被运用，强迫广告就是强迫观众要看的广告。其缺点是整体成本很高。一家公司要获得营销活动的成功，就需要把广告预算中的很大一部分安排来实现大量的每千人成本。

在别人的网站上放置旗帜广告，有几种不同的放置形式。最常见的形式是：交互旗帜广告、交换旗帜广告和付费广告。交互旗帜广告指 A 公司同意展示 B 公司的旗帜广告，同时，B 公司展示 A 公司的广告。它是一个在网站之间的直接链接。这可能是建立和维持旗帜广告的最便宜的形式，但却难以安排。交互旗帜广告常常不能实现，因为双方寻找匹配很难。不过，如果几家公司参与，多公司的匹配可能会更容易些。交换旗帜广告的组织安排有三个或更多合作伙伴参加交易。付费广告则是在互联网上购买旗帜广告空间，类似于在其他媒体上购买广告空间。

（2）弹出窗口。弹出窗口就是初始的网站页面，用来在短时间内捕捉用户的注意力，作为

一种促销或向网站主页的引导，或者告诉用户需要什么样的浏览器及其他软件来浏览网页。弹出窗口胜过其他任何广告方法的主要优点是可以创造新颖的多媒体效果，或者为一次访问提供足够多的资料传递。

（3）场地租赁。搜索引擎往往在其首页提供空间做商业租赁。租期取决于网站主人和承租人的合同协议。不像在不同的时段出现的旗帜广告，场地中的广告位置一直都不变，这样减少了竞争。场地租赁的劣势是广告往往小而受限制，致使有些浏览者错过了广告。同时，成本也很高。

（4）URL（统一资源定位器）。应用统一资源定位器作为广告工具的最大好处就是它的免费性，任何人都可以把他的 URL 提交给搜索引擎并加入列表中。因为关键词的作用，URL 的应用还可以锁定目标观众，同时将那些不想要的观众过滤出去。另一方面，URL 方法也有一些缺点。首先，由于激烈的竞争，公司在搜索引擎的首位排列很容易被其他公司取代，另外，不同的搜索引擎对列表的引用是不同的。

（5）电子邮件。另一种在网上做广告的方法是购买电子邮件地址，并把该公司的资料寄给在名单上的这些公司。这种做法的优点是低成本和联系多元化目标受众。大多数公司建立了他们发送电子邮件的客户数据库。电子邮件作为一种营销渠道正在兴起，它提供成本有效的实施方式和高于其他广告渠道的更好、更快的反应率。一个电子邮件地址列表可以是一个非常强大的工具，因为针对的是你有所了解的一群人。

（6）聊天室。电子聊天室是指一种实时与参加者交流信息的场所。软件业估计，数十万的网站有百万计的聊天室。卖主常出资赞助聊天室。通过让聊天软件供应商在他们的网站管理你的聊天讨论，聊天功能可以免费附加给你的商务网站。你要做的仅仅是把聊天室链接在你的网站，聊天室软件的卖主负责其余的全部事情，包括为某一个议题的讨论而支付的广告费。

阅读材料

网 络 出 版

网络出版是指报纸、杂志、新闻和其他信息在互联网中的电子传播。在大多数情况下，网络出版的内容是免费的，因此通常会链接广告，从而吸引人们去浏览广告网页。网络出版始于 20 世纪 60 年代，在当时用于提供在线文献及出售电脑数据库中所存储的知识。而公共拨款的网络出版是为了医学、教育和航天航空项目的研究。如今，网络出版有了许多不同的目的，涉及在世界范围内的信息传播及广告。一些新的互动技术及对互联网的其他应用也促进了网络出版的发展。

通过网络出版传播信息的一个最早的例子，就是在网上发表自己的学术著作以便让同行们进行评论。现在，网络出版主要用来传播信息和进行互动交易。将来，网络出版会包含更多为读者量身定做的资料，读者可以免费获得这些资料，有些也可能要付费。

网上有许多的网络报纸，大部分都是现有报纸的网页形式。一般的阅读都是免费的。

网络报纸似乎常被用来查找一些前期的刊物中遗漏掉的内容，或者是被用来阅读招聘广告，而并非被当做报纸来阅读。网络杂志吸引了一些读者群，但却很难吸引人们去订阅。因为大家都认为网上的东西应该是免费的，而且担心杂志不像其在网络中所呈现得那么好，即便好也不会在订阅后维持下去。

然而，网络确实对传统的报纸产生了威胁。发行报纸所得到的大部分收入并不是来源于读者为购买报纸而支付的价格，而是来源于广告商们在报纸上做广告而支付的广告费。但是现在，网络也可以用来发布招聘、住房和二手车的广告，而且收取的广告费用远低于在报纸上做广告所需要的费用。一旦这些广告都转移到了网络中，我们就很有可能买不到，至少无法用我们所期望的价格买到日报或当地报纸了。

网络出版的内容包括报纸、杂志、新闻、课本、音乐、文学著作、电视剧和电影。一些正在被使用的网络出版的方法包括：在线档案、新媒体、出版中介、动态和及时的出版。

在线档案是像图书馆书目和文献资料库那样的数字档案，基本上实现了纸质出版物的在线出版。那些视网络为创造新素材的媒体的出版商正在使用这些新媒体。对于任何话题，这种出版方式都增强了出版物的综合性，而这些是传统杂志无法提供的。新媒体实现这一目的的途径，是利用自己超文本链接的能力，提供相关的故事、主题和绘图等。它很容易满足读者的需要。新的媒介方式也提供一些包括刚刚发生的新闻的最新材料。

出版中介可以被当做搜寻信息服务的在线目录，是试图帮助人们在线寻找商品、服务和产品。网景公司提供的服务就是出版中介的例子。动态和及时的出版是网络出版的另一个方式。通过这种方法，内容可以被实时地创作出来，并用最适合用户地址、品位和偏好的形式传输。“动态”是因为它能够定制网页的内容以满足用户的偏好。而“及时”是指能够使得 Java 应用小程序和设计好的内容在用户需要时进入他们的电脑，一旦不需要这些程序和内容后，它们会自行失效。

第 6 单元　新　技　术

6.1　人工智能

课文

人工智能（AI）的概念可以看成两个方面：“什么是人工的本质”和“什么是智能”？第一个问题相对比较容易回答，但是就必然会引起什么是可以人造的问题。比如说，某种类型系统的局限性，如古典的计算系统、现有制造工序的局限性和人类智力的局限性在各方面约束了人造的能力。第二个问题引出了关于意识、自我和精神（包括无意识的）的基础存在问题。而且也引出了关于人类表现出的智能本质的问题，因为人类的智能行为是复杂的而且总是难以学习或理解。对动物的研究和对一些不是现有的简单模型的人工系统的研究经常被认为是高度相关的。

强人工智能的研究用来创造一些以计算机为基础、能真正推理和解决问题的人工智能，一个强类型的人工智能被认为是有知觉的，有自我意识的。在理论上，有两类强人工智能。

- 类人的人工智能，即计算机像人的头脑一样思考和推理。
- 非类人的人工智能，即计算机产生了完全和人不一样的意识，使用和人完全不一样的思考和推理方式。

弱人工智能的研究用于创造一些以计算机为基础、但只能在有限的领域内推理和解决问题的人工智能。这样的机器在某些方面表现出智能，但并不是真正拥有智能或感觉。

弱人工智能有很多领域，其中有一个就是自然语言。很多弱人工智能的领域都有专用的软

件和编程语言。

迄今为止，在这个领域大部分的工作已在以预先确定的规则为基础的计算机智能模拟实现。强人工智能方面的研究则处于停滞不前的状态。从如何确定目标的基础上看，弱人工智能方面已经取得了一定的成就。

人工智能大部分的初期研究来源于近似心理学的实验，而且强调的是什么会被称为语言上的智能。

近似于人工智能但并不是以语言上的智能为中心的，包括机器人学和集中智能近似，它们以动态环境处理或一致同意决策判定为中心，而且从生物学和政治方面寻求智能行为的组织模式。

人工智能技术也来源于动物的学习，特别是更容易用机器人模拟的昆虫和有比较复杂认识的动物，比如说和人有很多相像可是计划和认识能力比较弱的猿。人工智能的研究者认为这些比人类简单的动物应该可以更加容易模拟。可是还没有令人满意的动物智能计算模型。

历史上，有两个主要的人工智能研究类型——“简洁的”和“不简洁的”。“简洁的”也叫经典或符号型的人工智能研究，大体上讲，包括抽象概念的符号处理，而且是大多数专家系统中使用的方法论。与之对应的是“不简洁的”或者说“有联系的”，它最广为人知的例子是神经系统网络，它试着通过建立系统来形成智能，并用一些自动的进程完善它而不是系统地设计一些东西来完成这一工作。这两种方法在人工智能的历史上都出现得比较早，在 20 世纪 60 到 70 年代，不简洁的方法并不被重视，可是在 80 年代，当简洁的方法在时间上的局限性变得越来越明显的时候，它又被重新重视起来。然而，适用这两种主要途径的现代方法的严格的限制也越来越明显。

在20世纪80年代美国的高级防御研究计划机构和日本的第五代计算机系统计划都在人工智能研究方面有很大的投资。尽管有某些人工智能的从业者冠冕堂皇地承诺会尽快得出结果，投资工作还是失败了，因此在 20 世纪 80 年代后期，政府机构的投资相对大的减少了，导致了一段被称为“人工智能的冬天”的普遍低迷时期。在接下来的 10 年，尽管纯人工智能的研究还在较低的水平上继续，很多人工智能的研究人员转向相关较小目标的领域，如机器学习、机器人学和计算机视觉。

在制造像人一样的智能方面的发展已经减缓的同时，很多分支学科却发展起来了。最显著的例子是原本为人工智能研究发明，现在却应用于非人工智能工作的 LISP 和 Prolog 语言。

人工智能的基本课题包括取得知识、表达知识和运用知识。在应用领域，目前的研究主要集中在这些课题上。

- 解决难题

这里的难题是指那些根本没有算法或者算法在计算机程序中无法执行的难题。例如，路径计划、电力调度、股票行情分析、机器人行动计划等，以及在游戏中有一些难题，如 Hanol 塔问题、农夫过河问题、八个数问题、八皇后问题和旅行商问题。

- 自动翻译

自动翻译是指进行两种不同语言之间翻译的计算机程序。机器翻译不仅仅是“查字典”和“逐字”翻译。真正的翻译应建立在理解语义学和语法规则的基础上。

- 智能控制和智能管理

智能控制意味着将 AI 技术用于控制系统来解决诸如错综复杂、不完全、不明确或不确定的问题。随着将 AI 引进管理系统、信息管理系统、办公自动化系统和决策支持系统，其功能

和技术能够基于专家系统、知识工程、模式识别和人工神经元网络进行整合，从而形成新一代的计算机化的管理系统。

- 智能决策

随着 AI 与决策过程相结合，专家系统作为一个智能成分，与模型库、方法库、数据库和知识库一道，逐步形成最具智能化的决策系统。

- 智能模拟

模拟是指动态模型试验。根据三种不同形式的知识——描述性知识、目标知识和处理知识，产生另一种形式的知识——结论性知识。AI 技术用于整个模拟过程，包括建立模型、实际操作和结果分析，以指导和改进模拟模型。

很多其他有用的系统的建立都利用了某些曾经是人工智能研究的活跃领域的技术。包括以下例子：

1．深蓝国际象棋比赛计算机，在 1997 年的一场著名的比赛中击败了卡斯帕罗夫。

2．模糊逻辑，一种用于不确定情况下的逻辑，已经在工业控制系统中得到广泛的应用。

3．专家系统在一些区域企业中使用。

4．神经网络技术在多种工作中已经得到了广泛的应用，从侵入检测系统到计算机游戏。

5．手写识别在许多私人数字助理（PDA）中得到应用。

6．语音识别可用于商业并已得到广泛使用。

人工智能代替人的专业判断的梦想曾多次被提到，不管是在这个领域的历史上，还是一些科幻小说，或当今采用专家系统来辅助或代替专业人员判断的工程和医学等专门领域。

阅读材料

地理信息系统

地理信息系统（GIS）是发展最快的事务应用软件之一。GIS，如同美国国家基金会所定义的，是用于捕获、存储、检索、分析和显示空间（例如探测所确定的）数据的计算机化数据库管理系统。

一个 GIS 由下列三部分组成。

1．GIS 软件。

2．硬件。运行 GIS 所需的硬件依赖于三个相互相关的可变因素。（1）作用范围：用途数、应用程序数与用户数；（2）数据的规模：地图越详细，所需要的硬件的功能越要强；（3）功能度：对数据执行的功能或操作的数目以及各种功能的复杂性。

3．内部和外部的数据库。

开发 GIS 系统的关键是地理信息编码法。地理信息编码是把属性数据连接到地图的过程。街道地址地理信息编码是事务地理的基础技术。地理信息编码看来简单，但要做好，却要复杂得多。在目录中查找地址概念上是容易的，但会由于软件、地理信息编码参考目录或数据地址本身中的一些缺点而失败。

GIS 系统允许一系列的地图彼此覆盖，通过观察诸如计算机化地图的组合，零售商能立即看到他的销售额是高还是低，并且他的竞争对手是强还是弱。

GIS 系统允许以各种各样的方式访问数据。大多数全功能 GIS 系统结合了三种基本类型的能力：（1）表示映射；（2）使用地图作为组织工具；（3）空间分析。

GIS 系统有助于其业务开展的领域包括：（1）房地产；（2）直销；（3）保险；（4）金融；（5）服务行业；（6）制造；（7）运输和销售；（8）零售。

在市场上存在两类 GIS 应用程序。“开放系统”使得能从电子表格或数据库程序直接输入数据；“封闭系统”则不能。一般地，开放系统更为实用，但是它们在使用上是更有争论的。准备输入 GIS 的属性数据的责任落在了用户肩上。封闭系统是更易于使用的，属性数据整齐地排列在你的面前供你使用。

GIS 设计过程涉及四个基本要素：地理数据、属性数据（内部的与外部的）、地图绘制软件以及硬件。关于地理数据，要问的第一个问题是：“我对哪个地理区域感兴趣？”属性数据必须与 GIS 兼容，使得它能被输入到 GIS。地图绘制软件应支持数据录入、数据分析数据输出和显示，以及数据管理。至于硬件，GIS 将很快超过 GIS 销售商所推荐的最小系统需求。努力获取比你目前需要的更多。

非空间的、内部的和外部的属性数据是开发 GIS 的另一个主要成本。购买诸如商业人口统计数据库这样的外部数据和开发内部数据库总共能占到 GIS 系统总成本的 80%之多。

在设计 GIS 时，主要关心的是为作业选择恰当的属性数据。在美国，很多商业数据库是以美国人口统计局的数据为基础的。最主要的商业人口统计数据库销售商们对于消费者和商业数据两者都使用了复杂的分段技术，使基本的、原始的人口统计数据成为有价值的数据。外部数据也可以以较少的成本或者无成本，从政府代理、行业协会、大学、非营利团体和其他一些机构处获得。

6.2 虚拟现实

课文

虚拟现实（VR）是一项 20 世纪 80 年代后出现的新技术。然而仅仅几年，就已渗透到各个领域——科学、技术、工程、医学、文化、娱乐，并且它的应用潜力的确引人注目。

借助现有的成果，利用计算机硬件和软件及先进的传感器，研究人员能够创造三维人工虚拟环境，你可在其中漫步，四下观望和触摸环境中的每个物体。这种环境中的一切事物均与其他物体如此真实和谐地结合在一起，以致你可能觉得自己处在一个真实的物理环境中，但实际上却是在一个虚拟世界中漫游。

新兴的 VR 技术已经使各个领域的革新层出不穷。例如，人们有可能在绘制出一座建筑物或一架飞机的蓝图之前，就对其进行参观考察。医科学生能在 VR 环境中进行培训，这样就不会伤害病人，并能最大限度地降低手术的风险。

以下是如何成功运用 VR 技术的几个实例。

- 虚拟军事演习

20 世纪 80 年代初，五角大楼曾主持了一个训练坦克编队的虚拟战场。它在一个军事计算机网络上操作。这大大降低了训练费用并且确保安全。此后，五角大楼曾与德国合作组成一个由 200 辆坦克虚拟训练装置构成的网络，使部署在不同地点的士兵同时参加训练。在实战中，坦克、装甲车、直升飞机、火炮在统一指挥下参加协同军事行动。进行这类真实的训练耗资巨大，以至于在 20 世纪 80 年代末，出现了由坦克、直升飞机及其他军事设施构成的“虚拟部队”供虚拟军事训练之用。

- 建筑演练

建筑师和工程师不得不建造建筑物和工程的微缩模型，以表现他们的设计在竣工后的样子。但建造模型耗费资金并且很不准确。客户不可能在实际建筑物落成之前提出其改进设计的建议。随着 CAD 的不断发展，设计师能够运用图像技术在大屏幕上展示他们的设计，而且图像可能惊人地真实。但这还不足以让客户步入虚拟建筑物内四下观看。VR 技术提供了这一可能性。

在 20 世纪 80 年代中期，北卡罗来纳州大学决定建一栋耗资数百万美元的新楼。在进行大楼的初步设计时，VR 研究人员按照大楼的设计蓝图建了一个三维虚拟模型，客户借此得以“亲临其境”，走入大楼观看。客户提出门窗太低，建筑师不相信，直到他们亲自进入三维虚拟大楼实地测量并对设计做出部分更正。如今，这一系统已经大大改进。增加了模拟声响、模拟白天的阳光和夜晚的照明、模拟壁炉的火光等。该系统还能模拟用不同材料制成的家具和灯具并且放在不同位置供客户选择。

- 虚拟人体

目前，研究人员已经完成了人体各个部分的计算机模型，如骨骼、肌肉、皮肤和关节，并且建立了相当完整的解剖学数据库。VR 研究人员预期他们能建造更加真实的虚拟人体，这些人体能接受 MRI、CT 及其他用于手术前的“治疗”方案设计和专业培训。外科医生能通过头戴显示器看到虚拟病人，并且能在虚拟人体上打开观察窗，仔细检查每个细节。

虚拟现实可按很多不同的方式来细分。基于视觉通道，VR 系统可分为三个范畴。

- 头戴显示器/BOOM

头戴显示器（HMD）典型地也包括听觉通道用的耳机以及测量用户的位置与方向的一些设备，在 20 世纪 90 年代的大多数日子里，它们一直是主要的 VR 视觉设备。使用 CRT 或 LCD 技术，HMD 提供两个图像屏，每只眼睛一个。因此如果计算机功能充分强的话，立体平面的图像就被生成。一般地，虽然增加了逼真性的 HMD 把计算机生成的图像叠加在实际世界的视图上，用户完全沉浸在此情景中了。

HMD 的替代是 BOOM（双筒全方位监控器），两个高分辨率 CRT 被安装在一个标准部件内，用户的眼睛就对着它。使打包在独立式平台上的 CRT 平衡后，显示部件允许用户在其头上未放置重量时有六个自由度的移动。

HMD 和 BOOM 是类似的设备，其类似性在于用户完全沉浸在虚拟环境中而不查看他（她）的实际周围环境。BOOM 解决了 HMD 的几个局限（如分辨率、重量、视野），但其代价是要求用户站或坐在固定的位置而减少了沉浸的感觉。

- 沉浸室

头戴式显示器是演示虚拟环境中视觉通道的最普遍的方法，但沉浸并不一定要求使用头戴式显示器。CAVE^{TM}（Cave 自动虚拟环境）是芝加哥伊利诺斯大学开发的一类沉浸室设计，用投影到 2 或 3 面墙面及地板上，并允许用户交互地探测虚拟环境的办法来完成沉浸。一个沉浸室一般大约是 10 英尺×10 英尺×13 英尺（高度），允许六个或更多的用户检查在该空间内正被生成的虚拟世界。

当 HMD 需要用户在虚拟空间交互作用时（他们不能在他们的“实际”环境中彼此看到），沉浸室提供的重要好处是允许用户在实际世界中进行交互、讨论和分析。然而，在沉浸室内生成情景的计算费用是十分高的，必须以高刷新率为沉浸室中的每面墙生成两个图像。另外，每面墙需要高质量的投影仪，并且因为使用了背投，为了投影长度需要配给大的空间。因为成本

超过 50 万美元，沉浸室仅存在于少数大的研究机构和公司。

- VR 响应工作台

VR 响应工作台的操作方法是把一个计算机生成的立体图像投影到一面镜子上反射出来，然后投射到一个台子表面上，围绕此台子的一群用户观察此台子表面。使用有快门的立体双筒镜，用户观察显示在桌面上方的一个三维图像。通过使用磁传感器跟踪小组长之头与手的移动，工作台允许改变视角并且与三维景象进行交互。小组其他成员随着小组长的操纵而观察景象，这样便于在观察者之间就景象进行交流，并由小组长确定进一步的一些行动。交互作用是使用语言识别、姿势识别用的连指手套以及模拟的激光指示器来完成的。

虚拟现实建模语言（VRML）是一种描述交互式三维对象及客观世界的文件格式。VRML 用于 Internet、Intranet 和局域客户系统。VRML 也是组合三维图形和多媒体的通用转换格式。VRML 的应用领域很广，包括工程、科学可视化、多媒体演示、娱乐教育、Web 页面和共享虚拟世界等方面。

VRML 能表示静态及动态的三维和多媒体对象，并通过超链接到诸如文本、声音、电影及图像等其他媒体。VRML 浏览器，同制作 VRML 文件的制作工具一样，广泛应用于许多不同的平台上。VRML 支持扩展模式，即允许创建新的三维动态对象，并允许应用程序组开发在基础模式上加以扩展的可共同操作的文件。在 VRML 对象和通常使用的 3D 应用程序接口特性间有相应的映射。

VRML 规范定义了一种可将 3D 图形和多媒体结合起来的文件格式。总体上，每个 VRML 文件三维时间依赖空间，包含能够通过不同机制动态修改的图像和音频对象。VRML 定义了对象以及支持合成、封装和扩充机制的初始集。

阅读材料

普适计算与分布式计算

普适计算

普适计算指的是计算模式发展的第三代，现在才刚刚起步。第一代是大型机时代，由多人共享一台主机。现在我们正处于个人计算机时代，在这个时代里，人与机器就通过一台台式计算机互相目不转睛地“凝视”对方。接着到来的是普适计算时代，或者说是平静技术时代。这个时代，所谓的技术将退至我们日常生活的幕后，苹果公司的艾伦·凯把这称做“第三代模式计算机”。

概括地说，普适计算与虚拟现实是相对应的。虚拟现实把人们放在一个计算机制造的世界里面，而普适计算则是要驱使人们与计算机一起在这个世界里生活下去。虚拟现实主要是一个解决动力的问题，而普适计算则是一个非常艰难的人为因素集成，它包括计算机科学、工程学和社会科学。

普适计算带给我们更容易地管理信息的工具。信息是全球经济的新货币。我们越来越依赖于个人的、财务的以及其他保密信息的电子化创建、存储和传递，并且所有这些交易都要求达到最高的安全级别。我们要求能完整地访问时间敏感性数据，而不管其物理位置。我们期望所有的设备——个人数字助手、移动电话、办公室 PC 和家庭娱乐系统——都能访问到那些信息，并且能在无缝连接的集成化的系统环境下一同运作。普适计算能帮助我们快速、有效、简便地

管理信息。

普适计算将使我们的生活变得更加简单。普适计算的目的是使人们能够使用新型的、智能化的和便携式的设备完成越来越多的个人和专业化操作。它带给人们的是便利地获取存储在强大的网络上的相关信息，从而允许人们在任何地点、任何时间很容易地采取行动。

这些新的智能装置或“智力设备”被深深地嵌入到微型处理器中，从而允许用户进入智能化网络，获取直接、简单并且安全的相关信息和服务。这些设备的使用就像计算器、电话、厨房烤面包机一样简单。

普适计算通过把每天的日常活动与基于公开标准的应用设备结合起来以简化人们的生活。它除去新技术的复杂性，使我们能够更有效率地工作，并且把更多的休闲时间留给我们。计算不再是一项被绑在台式机上的分离的活动，普适计算正迅速地成为日常生活的一部分。

IBM 是普适计算领域的先锋。它在这一技术团体里处于领先地位，并且主动关注能推动普适计算持续成长、发展的公共标准。IBM 不断协调着它对商务交易的理解和透过分析企业数据及全球经济得出的一个高瞻远瞩的商业远景图和解决办法的能力。并且他们在网络环境下的安全解决方案上的领导地位符合了他们建立一个既相互连接又安全可靠的世界的职责。

分布式计算

分布式计算环境（DCE）的线程服务提供了可移植功能，允许程序员编写一个能同时完成多个动作的应用程序。线程服务也包括了在单个进程中生成和控制多线程执行的操作，以及在一个应用程序内使全局数据进行同步存取。这个线程功能在远程过程调用（RPC）的条件下尤为重要。从本质上讲，RPC 是同步操作。客户机发出对远程功能的调用，然后等到该请求实现为止。然而，利用多线程，一个线程可以发出请求，而另一个线程开始处理来自不同请求的数据。线程技术能大大地改善一个分布应用程序的性能。

线程服务比其他技术，如显式异步操作或共享存储器对程序员技能的要求要低些。异步接口虽然在一些环境中已存在了一段时期，但它需要的再培训可能会造成很大的成本开支，一项新技术所需的重新培训应该越少越好。

RPC 是一种经检验证实可靠的进行分布处理的模式。其功能是使一个应用程序中的过程能在网络中任何一台计算机上正常运行。RPC 的这类方法的好处是使程序员工作得以简化。RPC 尽可能地保持接近本地过程模式，同时以直接的方式提供应有程序的分布式功能。换言之，它给开发人员减少概念上的变化，从而减少再培训的时间。这对公司内部的开发队伍来说，尤为重要。不管采用何种传输协议，RPC 在应用程序中都能提供一致的表现形式并使系统连接管理隐藏。这意味着开发人员不必为了支持不同的传输服务而重写应用程序。RPC 接口同时支持各种传输，并能引入新的传输与协议而不影响应用程序的编写。

6.3 神经网络

课文

人工神经网络（ANN）是一个基于连接计算方式的信息处理的数学或者计算模型。至于什么是神经网络，研究者之间还没有达成一致的准确定义，但是大部分的研究者都认同它包括一个网络，含有相对简单的处理单元，其内部的全部行为都是由处理单元和单元参数之间的连接决定的。这项技术的最初灵感来自于对由神经元和神经突触构成的大脑的生物电网络的研

究。在一个神经网络模型中，简单的节点（“神经元”或“单元”）相互连接构成一个节点网络——因而有了术语“神经网络”。神经网络是一个相互连接的节点组，类似人脑的广大神经元网络。

神经网络的结构及应用

像大脑一样，ANN 是一个由小且简单的处理单元组成的庞大的并联集，大部分的网络智能是由处理单元间的相互连接形成的。然而人工神经网络与人脑在结构上有相当大的不同。例如，神经网络比人脑小得多。而且，神经网络中使用的单元明显比神经元简单多了。不过，某些似乎只有人脑才具有的功能，如学习，在神经网络上已经有了一个比较简单层次上的模拟。

典型的前馈神经网络是一个节点集。这些节点中的一些节点被指定为输入节点，一些指定为输出节点，在这两者之间的是隐藏节点。神经元间的每个连接都有一个用数字表示的权，当神经网络运行时，每个输入节点都会被赋予一个值，这些值是由人类操作员从环境传感器或者一些外部程序输入。然后每个节点把给定的值传给从它开始的连接点，在每个连接点上这个值乘以与该节点相关联的权值。下一层的每个节点随后接收到导向自身的节点产生的值的和，而且每个节点上进行针对该数值的简单计算——这个就是典型的 S 型函数。把计算结果传给后续层的节点，重复这个过程直到到达输出节点。

一般来说，神经网络的权值被初始化为一些小的随机数。这意味着网络什么都不知道，它的输出从本质上来说是其输入的一个随机函数。随着训练过程不断进行，连接点的权值根据特定的学习算法的计算规则逐渐改变。理想地，权值最后收敛为一个允许它们进行有效计算所需的值。

神经网络在处理实值有界数据问题上特别有用，这个问题需要一个实值输出。这样，神经网络按照度来进行分类，能够表示出等价于“不确定”的值。

在实际生活应用中，神经网络在以下的常见任务中运行得特别好：

- 函数逼近；
- 时间序列预测；
- 分类；
- 模式识别。

其他类型的神经网络，特别是连续回归神经网络，与遗传算法一起使用产生了机器人控制器。网络参数构成了染色体组，网络的适应值是指受控制的机器人所呈现出来的行为的适应值。

由于类似神经系统结构的原理，ANN 有许多优势。

- 学习能力：ANN 有能力在所谓的学习阶段基础上进行学习。
- 自组织：ANN 在学习过程中创造了对给定数据的自身表示法。
- 容错：由于存储了多余的信息，ANN 的局部破坏不会完全损坏神经网络的反应。
- 灵活性：ANN 可以处理没有重大变化的输入数据，如噪音信号或给定输入数据的其他变化。
- 实时：ANN 的结构是并行的，如果通过使用计算机或特殊的硬件来执行，实时是可以实现的。

神经网络的类型

- 单层感知器

最早的神经网络类型是单层感知器网络，它是由单一的输出节点层组成的，输入通过一个权值序列直接传递给输出。由于采用这种方式，所以它被认为是最简单的前馈神经网络。

- 多层感知器

这类网络由多层的计算单元组成，它们通常以前馈的形式相互连接。每层中的每个神经元与后继层的神经元之间有直接的连接。在许多应用方面，这些网络的单元把 S 型函数作为激活函数。

多层网络使用各种各样的学习技术，其中最流行的是反向传播。这个方法将输出的值和准确答案进行比较，来计算某个预先确定的误差函数的值。通过各种各样的技术，误差经过网络反馈。利用这个信息，算法对每个节点的权值进行调整，把误差函数值减少到某个小的数量级。这些操作重复了相当多个训练周期后，网络通常收敛到某个状态，该状态下计算误差很小。这样，我们就说这个网络已经学会了某个目标函数。

- 递归网络

递归网络是具有双向数据流动的模型。前馈网络从输入到输出线性传播数据，递归网络也传播数据，不过是从稍后的处理阶段向稍前阶段传播。

- Hopfield 网络

Hopfield 网络是一个递归神经网络，其中所有的连接都是对称的。这个网络是由 John Hopfield 在 1982 年发明的，它确保其动态最终会收敛。如果连接是通过使用 Hebbian 学习法训练的，那么 Hopfield 网络可以实现充分的可定址存储器及连接改变。

- 机器委员会

机器委员会是不同神经网络的一个联合体，它们表决产生一个给定的例子。与其他神经网络模型相比，它通常产生一个好得多的结果。事实上，在很多例子中，以相同的体系和训练方法开始，但初始的随机权值不同，会产生极不相同的网络。机器委员会倾向于使结果得以稳定。机器委员会和通用的机器学习上的打包方法相似，不同的是，委员会必要的机器类型的获得不是基于随机选择的不同训练数据的子集训练，而是来自不同的随机开始权值的训练。

- 即时训练网络

即时训练神经网络也称为“Kak 网络”，以它的发明者 Subhash Kak 名字命名。这种网络的灵感来自于那种似乎即时发生的短期学习现象。在这些网络中，训练的向量数据直接映射到隐藏层和输出层的权值上。通常，它们以二进制数据形式工作，但对需要少量附加处理的连续数据也是可用的。

阅读材料

桌面会议与专家系统

桌面会议

视频会议正逐渐成为一种大家认可的开展业务的方式。但长期以来，视频会议套件的形象不佳，运作烦琐且费用昂贵，还需要提前很长时间预定。它的使用越来越局限在位于不同大陆的高级官员开会，其日常用途的实用性越来越被忽视。若了解此技术的现状，就完全可理解。但几年前，桌面视频会议进入市场，并大张旗鼓地宣传，从此以后使用量一直稳定增长。

我们工作方式的变化将是该技术应用增长最重要的刺激之一。移动工作正在使传统的通信

方式变得陈旧，快速信息交换成为优先选择。在不断变化的工作环境中，视频会议被很好地定位成帮助那些与雇员即时通信依赖性很高的公司，以满足其通信需求。

对那些刚使用视频会议的人来说，定义视频会议的主要使用领域对帮助他们理解这个市场是有意义的。视频会议能实现世界上任何不同地点之间的音频和视频传输。视频会议可以完全像打电话那样点对点，或者在三个或三个以上地点之间开多点的“虚拟”会议，上述两种最常使用 ISDN 网。

多点会议需要一个叫多点控制器（MCU）或“桥”的物理装置。MCU 的功能是识别每个与会者都在使用工业标准，然后将所有参与人连接在一起。操纵桥的技术复杂性要求在一个单位内有电信部门，然而多数单位选择时都避免与此相关联的费用与工作，而去利用多点服务供应商，这正是 AT&T 的专长所在。

Intel 公司生产了 Proshare 桌面会议软件，正在积极地打入商业市场，并试图降低视频会议的成本。他们相信，在将来视频会议将成为一种“标准”，它们会像目前 PC 上装有的其他软件一样普遍。

这种桌面产品的主要优点是数据共享能力。它允许一个用户运行一个应用软件，并与其他用户共享。此功能的优点是显而易见的。在世界任何地方的台式机用户可以实时地获得同意并修改文件，而不是来回地用传真发送带有修改意见的文件，或企图用电话来修改文件，这常常导致出错。在多点环境中，共享的应用程序使用 T.120 工业标准运行。

办公桌上的 PC 对你来说什么时间都可以用，要开一个三人或三人以上会议所需做的只是向多点服务供应商（如 AT&T）预定一个通话，拨号进入桥即可。然后就能与世界上多达 24 个地点相连接。这不仅省时、省钱，而且也能发展更有效的与同事、客户或供应商面对面的工作关系。

专家系统

专家系统是使用经过编码的知识来解决专门领域中的问题的一组程序，这个专门领域通常需要人的专门知识。专家系统的知识从各种专家源获得，并且以适合于系统在其推理过程中使用的形式编码。专家知识必须从专家或其他专门知识源，如教科书、杂志文章和数据库中获得。这类知识通常需要在诸如医学、地质、系统配置或工程设计等一些特定领域中的许多培训和经验。一旦已收集了足够多的一批专家知识，它必须以某种形式进行编码，放进知识库，然后进行测试，并且在系统的整个生存期期间不断改进。

专家系统在以下几个重要方面与常规计算机系统不同。

1. 专家系统使用知识而不是数据来控制求解过程。大部分使用的知识实际上是启发式的，而不是算法型的。

2. 知识作为一个与控制程序分开的实体进行编码和维护。因此，它不与控制程序一起编译，这就允许增量式地增加和修改知识库，而不需重新编译控制程序。

3. 专家系统能够解释一个特定的结论是怎么得到的，以及在咨询过程中为什么需要所要求的信息。

4. 专家系统对知识使用符号表示法（规则、网络或框架），并且通过符号计算进行推理，这非常类似于自然语言处理。

5. 专家系统经常用元知识进行推理，即它们用自身的知识和它们相关领域的知识及能力来进行推理。

附录A　计算机专业英语词汇表

A

a user password and code 用户口令和密码
abnormal end 异常终止
abstract data type 抽象数据类型
abstract class 抽象类
access control 访问控制
access list 访问控制表
access permission 访问许可
accessory program 附件程序
account 账号
acoustic coupler 声音耦合器
active desktop 活动桌面
active window 活动窗口
acyclic directory structure 非循环目录结构
adapter card 适配卡
adaptive scheduler 自适应调度
address space 地址空间
adjancency multilists 邻接多重表
agent 代理，智能体
algorithm 算法
animation 动画
antivirus program 防病毒程序
application integration 应用程序集成
application layer 应用层
application object 应用对象
application server 应用服务器
architecture 体系结构
archive 存档
assemble 汇编
asymmetric encryption 非对称加密
asymptotic time complexity 渐进时间复杂度
asynchronous 异步
asynchronous primitive 异步原语
atomic action 原子操作
atomicity property 原子属性
attachment 附件
attribute 属性
authenticating 认证，认可，证实
authenticating transactions 交易认证
automation server 自动化服务器
auto-answer 自动应答

B

backbone 主干网
background 后台
backup 备份
back tracking 回溯
bandwidth 带宽
Banner 旗帜广告，Web 页面中小幅广告部分，通常为长条形
bar-code 条形码
baseband 基带
base class 基类
batch processing 批处理
baud 波特
baud rate 波特率
benchmarking 基准测试
binary 二进制
bind 绑定
bit 位，比特
bitmap 位图
black box 黑盒子
book trips 预定旅程
Boolean logic 布尔逻辑
branch 分支
broadband network 宽带网络
broadcast storm 广播风暴
Browser 浏览器
bubble jet printer 喷墨打印机

buffer 缓冲区
bulk storage 大容量存储器
bus-contention 总线争用

C

callback 回调
carriage return 回车
certificate authority 证书认证
channel 信道，通道
chat room 聊天室
check balancing 账单结算
check box 复选框
child class 子类
child window 子窗口
chip set 芯片组
cipher text 密文
circuit switching 电路交换
class declaration 类声明
class library 类库
click 单击
click-through ratio 点击率
client 客户机
client/server 客户机/服务器
clipboard 剪贴板
close box 关闭框
Cluster 簇
column 列
command button 命令按钮
comment 注释
communication deadlock 通信死锁
compile 编译
compression 压缩
computer integrated manufacturing 计算机一体化制造系统
concurrent control 同期控制
configuration 配置
congestion 拥塞
connectionless service 无连接服务
connection-oriented service 面向连接的服务
console 控制台
Container 容器，一种特殊的屏幕区域和组件，其中可包含组件
control box 控制框
Control Panel 控制面板
cooling fan 冷却风扇
copyright 版权
core dump 内核转储
cracker 黑客
crawler 网络爬虫
credit 信用卡
critical paths 关键路径
critical region 临界区
cryptography 密码学
custom 定制
customlization of products and service 定制产品和服务
cyberbank 网络银行
cybermarketing 纯网络营销
cybermall 大型网络商场，网络商业区
cyberspace 网络空间

D

Data BUS 数据总线
data flow diagram 数据流程图
data link layer 数据链路层
data stream 数据流
data structure 数据结构
database 数据库
database interface 数据库接口
database server 数据库服务器
datagram 数据报
data source 数据源
data window object 数据窗口对象
deadlock 死锁
debugger 调试器
decode 解码
decryption 解密
dedicated line 专用线路
default 默认
demo 演示软件
Desktop 桌面
device dependent 设备相关的

device independent 设备无关的
device object 设备对象
diagnosis 诊断
dialog box 对话框
dialup 拨号
digital camera 数码相机
digital cash 数字现金
digital certificate 数字证书
digital signature 数字签名
digital subscriber 数字用户服务
digital time-stamp 数字时间戳
direct marketing online 网上直销
directed acycline graph 有向无环图
directory 目录
diskless workstation 无盘工作站
display adapter 显示适配器
distributed database 分布式数据库
distributed processing 分布式处理
distributed system 分布式系统
downloading 下载
drop-down listbox 下拉式列表框
drop-down menu 下拉式菜单
duplication 复制
dynamic binding 动态绑定
dynamic IP address 动态 IP 地址
dynamic router 动态路由器

E

eavesdropper 窃听者
edutainment 寓教于乐，娱乐教育
electronic bank 电子银行
electronic community 电子社区
electronic intermediary 电子中介商
electronic invoice 电子发票
electronic meetings 电子会议
electronic payment system 电子支付系统
electronic procurement 电子采购
electronic wallet 电子钱包
embedded computer 嵌入式计算机
embedded real-time system 嵌入式实时系统
emulation 仿真
encapsulation 封装，将相关的数据和过程打包在一个对象中
encoding 编码
encryption 加密
encryption key 加密密钥
end user 终端用户
end-to-end 端到端的
entity 实体，OSI 模型中活跃在每一层的单元
environment variable 环境变量，由系统设置的变量或者由用户在系统命令行上设置的变量
error correction 纠错
Ethernet 以太网
exception 异常
execution 执行
expanded memory 扩充内存
expansion bus 扩展总线
expansion slot 扩展插槽
expert hypermedia 智能超媒体
expert system 专家系统
extended attributes 扩展属性
extended memory 扩展内存
external frequency 外频，CPU 的基准频率，也称为系统总线频率
external procedure 外部过程
Extranet 外联网

F

fast packet switching 快速分组交换
fatal error 致命错误
fault tolerance 容错
fiber-optic table 光纤
field 字段，数据库中表的每一列称为一个字段
file handle 文件句柄
file server 文件服务器
file system 文件系统
filter 过滤器
Firewall 防火墙
flash memory 闪存
flexible manufacturing systems 柔性制造系统

floppy disk 软盘
flow control 流量控制
footer 脚注
force feedback 强力反馈
foreground job 前台作业
foreign agent 外地代理
Foreign Key 外键，数据库中用以建立同其他表间的关联
format 格式化
fragmentation 分段
frame relay 帧中继
frame 帧
front-end 前端，前台
full-screen 全屏
function 函数

G

gang scheduling 集体调度
gateway 网关
gateway server 网关服务器
generalized lists 广义表
gigabit network 千兆网
global scheduler 全局调度
gopher 用来查询信息的服务系统
graphic 图形
grid 网格
groupware 群件
guidance 向导，指导

H

hacker 黑客
hanging indent 悬挂式缩进
hashed file 散列文件
head pointer 头指针
head node 头节点
header and footer 页眉和页脚
heap sort 堆排序
hexadecimal 十六进制
hierarchical directory structure 层次目录结构
high-level language 高级语言
highlight 高亮度
hits 点击率
holography 全息术
home bank 家庭银行
home page 主页
hub 集线器
Huffman codes 赫夫曼编码
Huffman tree 赫夫曼树
hyperlink 超链接
hypermedia 超媒体
hypertext 超文本
hypertext server 超文本服务器

I

icon 图标
identifier 标识符
image 图像
index 索引
indexed file 索引文件
information superhighway 信息高速公路
inheritance 继承
initialize 初始化
inorder traversal 中序遍历
insertion sort 插入排序
install 安装
instruction 指令
integrated network 集成网络
intellectual property 知识产权
interactive advertisement 交互式广告
interactive video 互动视频
interface 接口，界面
internal sorting 内部排序
internet 互联网
interrupt 中断
inverted file 倒排文件

J

job class 作业分类，作业类别
job scheduler 作业调度程序
job object 作业对象

joy stick 控制杆
journal file 日记文件
jump 转移
just-in-time service 即时服务

K

kernel 核心
key 关键字
keyboard 键盘
keypad 辅助小键盘
keyword 关键字
kit 块、包
knowledge 知识

L

label 标记，记号
laser printer 激光打印机
library 库
line spacing 行间距
linear linked lists 线性链表
linear lists 线性表
link 链接
linked list 链表
linked radix sort 链式基数排序
liquid crystal 液晶
list of three-tuples 三元组表
literal 文字的
load 装载
local scheduler 本地调度
local variable 局部变量
log file 日志文件
logical link control 逻辑链路更新
logical structures 逻辑结构
log in 登录
log out 注销登录

M

machine code 机器码
machine language 机器语言
mailbomb 邮件炸弹
mailing list 邮件组，邮件清单
main window 主窗口
map 映射（将虚拟地址转换为物理地址）
menu bar 菜单栏
message digest 消息摘要
micro recorder 宏记录器
middleware 中间件
mirror 镜像
modeling language 建模语言
mother board 主板
mount 装配
multicomputer 多计算机
multidocument interface 多文档界面
multiline edit box 多行编辑框
multiple inheritance 多重继承
multi-threaded 多线程
multi-processor 多处理器
multitasking 多任务
mutex 互斥量
mutual exclusion 互斥

N

natural language 自然语言
navigate 导航
netmask 子网掩码
NetMeeting 是一个可以通过 Internet 或 Intranet 使用的数据、音频、视频进行应用程序共享、举行在线会议、用户在线聊天的工具
networking 网络化
network layer 网络层
network structure 网络结构
network system 网络系统
netter 网上漫游者
network administer 网络管理员
node 节点
non-blocking primitive 非阻塞原语
non-impact 非击打式
nozzle 喷头
null string 空串
numerical 数字的

Num lock 数字键锁定

O

object 对象
object-based system 基于对象的系统
object-oriented 面向对象
object packager 对象包装
object-oriented system 面向对象系统
offline 离线
online 在线
online advertising 在线广告
online entertainment 在线娱乐
online procurement system 在线采购系统
online service 在线服务
online subscription 网上订阅
open system 开放系统
operand 操作数
operational 操作的
optimal scheduling algorithm 最优调度算法
optimal tree 最优树
optional 可选的
ordered tree 有序树
orthogonal list 十字链表
outlet 插座
outline view 大纲视图
overflow 上溢
overfrequency 超频
Overlapped 重叠
overloading 重载

P

package 软件包
packet 数据包
packet-filtering gateway 数据包过滤网关
paperless transaction 无纸交易
payment system 支付系统
pull technology 拉式技术
push technology 推式技术
packet switching 包切换
page fault 页故障
parallel port 并行接口
ParentWindow 父窗口
Pentium 奔腾计算机
permission 许可，特制资源拥有者对共享该资源的人的信任程度
photo-sensitive drum 感光鼓
pin printer 针式打印机
pipe 管道，指一个实用程序或者应用程序的输出可被导向另外一个应用程序作为其输入
pixel 像素
platform 平台
plug and play（or PnP, P&P）即插即用
pointing device 定位设备
point-to-point layer 点对点层
polymorphism 多态，同一个对象中的两个或多个名字相同、参数列表不同的函数
pop-up menu 弹出式菜单
pop-up Window 弹出式窗口
preemptive multitasking 抢先式多任务
Primary Key 主键，唯一标识数据库表中每条记录的一个或多个列
private key cryptography 私钥加密
process 进程
programming 编程
protocol 协议
proxy server 代理服务器
public key 公开密钥
public key cryptography 公钥加密
publishing 发布

Q

Quad speed 四倍速
quadratic probing 二次探测
quantizer 数字转换器，编码器
quantometer 光谱分析仪
query 查询
queue 队列

R

radio button 单选按钮
raster 光栅
real time system 实时系统
receiver 接收者
recipient 收件人
recorder 记录器
recursive function 递归函数
refresh 刷新
register 注册
repeater 中继器
remark 注释
remote 远程
reset 复位
resident 驻留的
resolution 分辨率
respond 响应
response time 响应时间
routing algorithm 路由算法
response window 响应式窗口
restore 恢复
retrieve 检索
right-click 右击
ring network 环形网络
robotics 机器人技术
root 根
router 路由器
routing 路由选择
ruler 标尺

S

safe mode 安全模式
scalability 可伸展性
scanner 扫描仪
screen capture 屏幕捕获
screen saver 屏幕保护程序
Script 脚本
Sector 扇区
security certificate 安全认证
serial port 串行接口
Service Pack 服务包
session 会话
setup 安装
shared variable 共享变量
shopping online 在线购物
Shortcut 快捷方式
Shortcut Key 快捷键
signature 签名
simulator 仿真器
single-line edit box 单行编辑框，一个包含单行文本的控件。
site 站点
smart card 智能卡
socket 套接字
source code 源代码
speech generator 译音发生器
speech recognition 语音识别
speech synthesizer 语音合成器
spreadsheet 电子表格
stack 堆栈
startup 启动
status bar 状态栏
stereovision 立体视觉
stock trading online 在线股票交易
storage class specifier 存储类标识符
structure 结构体
structure chart 结构图
subdirectory 子目录
subnet 子网
subroutine 子程序
Suite 套件
supercomputer 超级计算机
super user 超级用户
swap area 交换区
switch 交换机
synchronous 同步
system board 系统板，主板
systems administrator 系统管理员

T

taskbar 任务栏
telecommunicating 电子通信

terminal 终端
thread 线程
three-dimensional graphics 三维图像
time-sharing 分时
time slicing 时间分片
title bar 标题条
toggle switch 拨动开关
toner 墨粉，碳粉
topology 拓扑
touch-sensitive display 触控式显示器
traffic 通信量
traffic control 业务量控制
transaction 事务
transaction costs 交易成本
translation 转换
translator 翻译程序
transport layer 传输层
trap 陷阱
typeface 字体
typography 印刷样式

U

unauthorized access 未授权访问（非法闯入计算机系统的行为）
undirected graph 无向图
unordered tree 无序树
union 共同体
upgrade 升级
upload 上传
upstream 向上传输
Usenet 新闻组
user account 用户账号
user-defined 用户自定义
user ID 用户标识符
user interface 用户界面
User Object 用户对象

V

vector 矢量
version 版本
video bandwidth 视频带宽
video capture card 视频采集卡
video conferencing system 电视会议系统
video dialtone 视频拨号
video display 视频显示
video game 视频游戏
video telephone 可视电话
Video Text 可视图文
virtual address space 虚拟地址空间
virtual banking 虚拟银行
virtual community 虚拟社区
virtual store 虚拟商店
virtual block caching 虚拟块高速缓存
virtual circuit packet switching 虚电路分组交换
virtual device 虚拟设备
Virtual Host Service 虚拟主机服务
virtual IP address 虚拟 IP 地址
virtual memory technology 虚拟存储器技术
virtual network 虚拟网络
virus checker 病毒检查程序
visual arts 视觉艺术
visual cues 视觉线索
voice mail 语音邮件
Voice Messaging 语音信息传递
Voice Synthesis 语音合成
volatile 易失性的
volume file 卷文件

W

warm boot 热启动
wave form 波形
wave length 波长
Web page 网页
Web paging 网页寻呼
Web server Web 服务器
Web site Web 站点
wheel 特权用户
Wild Card Character 通配符
Window Painter 窗口画板
Windows 窗口

windows message 窗口消息
wireless communication 无线通信
wiretapping 窃听
wizard 向导工具
word processing 文字处理
workgroup hub 工作组集线器
workstation 工作站
workspace 工作区

X

xerography 干印法，静电复印术

Y

Yahoo 雅虎，美国四大信息检索公司之一
yoke 磁头组

Z

zero access 立即存取
zero complement 补码
zero suppression 消零
ZIP Driver ZIP 驱动器
zone 区域
zoom 放大

附录B　计算机专业英语缩写词表

A

AAL（ATM Adaptation Layer）ATM 适配层
ABEOJ（Abnormal End of Job）作业异常终止
ACL（Access Control Lists）访问控制表
ACPI（Advanced Configuration and Power Interface）高级配置和电源接口
ACM（Association for Computer Machinery）计算机协会
ADSL（Asymmetric Digital Subscriber Line）非对称用户数字线路
AGP（Accelerated Graphics Port）图形加速端口
AI（Artificial Intelligence）人工智能
ANC（Abnormal Network Cause）异常网络原因
ANSI（American National Standard Institute）美国国家标准协会
AOL（American Online）美国在线
API（Application Programming Interface）应用程序设计接口
APL（A Programming Language）编程语言
APPN（Advanced Peer-to-Peer Network）高级对等网络
ARP（Address Resolution Protocol）地址分辨/转换协议
ASCII（American Standard Code for Information Interchange）美国信息交换标准代码
ASP（Application Service Provider）应用服务提供商
AST（Average Seek Time）平均访问时间
AT&T（American Telephone and Telegraph Company）美国电报电话公司
ATM（Asynchronous Transfer Mode）异步传输模式
ATM（Automatic Teller Machine）自动柜员机

B

B2B（Business to Business）商业机构对商业机构的电子商务
B2C（Business to Consumer）商业机构对消费者的电子商务
BBS（Bulletin Board System）电子公告牌系统
BGP（Border Gateway Protocol）边缘网关协议
BIOS（Basic Input/Output System）基本输入输出系统
BISDN（Broadband-Integrated Services Digital Network）宽带综合业务数字网
BLU（Basic Link Unit）基本链路单元
BOF（Beginning Of File）文件开头
BPS（Bits Per Second）每秒比特数
BRI（Basic Rate Interface）基本速率接口

BSP（Byte Stream Protocol）字节流协议
BSS（Broadband Switching System）宽带交换系统

C

C2C（Consumers to Consumers）消费者对消费者的电子商务
CA（Certificate Authorities）认证中心
CAD（Computer Aided Design）计算机辅助设计
CAE（Computer-Aided Engineering）计算机辅助工程
CAI（Computer Aided Instruction）计算机辅助教学
CAM（Computer Aided Manufacturing）计算机辅助管理
CASE（Computer Assisted Software Engineering）计算机辅助软件工程
CAT（Computer Aided Test）计算机辅助测试
CATV（Community Antenna Television）有线电视
CB（Control Bus）控制总线
CCITT（Consultative Committee on International Telephone and Telegraph） 国际电话电报咨询委员会
CCS（Common Channel Signaling）公共信令
CDFS（Compact Disk File System）密集磁盘文件系统
CD-MO（Compact Disc-Magneto Optical）磁光式光盘
CD-ROM（Compact Disc Read-Only Memory）只读光盘
CD-RW（Compact Disc ReWritable）可读写光盘
CGA（Color Graphics Adapter）彩色显示器
CGI（Common Gateway Interface）公共网关接口
COM（Component Object Model）组件对象模型
CORBA（Common Object Request Broker Architecture）公共对象请求代理结构
CPC（Cost Per Click-through）每次点击成本收费模式
CPM（Cost Per thousand iMpressions）千人印象成本收费模式
CPU（Central Processing Unit）中央处理单元
CRC（Cyclical Redundancy Check）循环冗余校验码
CRM（Client Relation Management）客户关系管理
CRT（Cathode-Ray Tube）阴极射线管，显示器
CSS（Cascading Style Sheets）层叠式表格
CTS（Clear To Send）清除发送
CUI（Command User Interface）命令用户界面

D

DAO（Data Access Object）数据访问对象
DAP（Directory Access Protocol）目录访问协议
DBMS（Database Management System）数据库管理系统
DCE（Data Communication Equipment）数据通信设备

DCE（Distributed Computing Environment）分布式计算环境
DCL（Data Control Language）数据控制语言
DCOM（Distributed COM）分布式组件对象模型
DDB（Distributed DataBase）分布式数据库
DDE（Dynamic Data Exchange）动态数据交换
DDI（Device Driver Interface）设备驱动程序接口
DDK（Driver Development Kit）驱动程序开发工具包
DDL（Data Definition Language）数据定义语言
DDN（Data Digital Network）数据数字网
DEC（Digital Equipment Corporation）数字设备公司
DES（Data Encryption Standard）数据加密标准
DHCP（Dynamic Host Configuration Protocol）动态主机配置协议
DLL（Dynamic Link Library）动态链接库
DMA（Direct Memory Access）直接内存访问
DML（Data Manipulation Language）数据操纵语言
DMSP（Distributed Mail System Protocol）分布式电子邮件系统协议
DNS（Domain Name System）域名系统
DNS（Domain Name Server）域名服务器
DOM（Document Object Mode）文档对象模型
DOS（Disk Operation System）磁盘操作系统
DSM（Distributed Shared Memory）分布式共享内存
DSN（Data Source Name）数据源名称
DSP（Digital Signal Processing）数字信号处理
DTD（Document Type Definition）文件定义类型
DTE（Data Terminal Equipment）数据终端设备
DVD（Digital Versatile Disc）数字多用途光盘
DVI（Digital Video Interactive）数字视频交互
DVI（Digital Visual Interface）数码视像接口

E

EDI（Electronic Data Interchange）电子数据交换
EEPROM（Erasable and Electrically Programmable ROM）电可擦除可编程只读存储器
EFT（Electronic Fund Transfers）电子转账系统
EGA（Enhanced Graphics Adapter）彩色显示器，分辨率为 640×350，可以显示 16 种颜色
EGP（External Gateway Protocol）外部网关协议
EISA（Extended Industry Standard Architecture）增强工业标准结构
EMS（Expanded Memory Specification）扩充存储器规范
EPH（Electronic Payment Handler）电子支付处理系统
EPROM（Erasable Programmable ROM）可擦除可编程只读存储器
ERP（Enterprise Resource Planning）企业资源计划
ETM（ExTended Memory）扩展存储器

F

FAT（File Allocation Table）文件分配表
FCB（File Control Block）文件控制块
FCFS（First Come First Service）先到先服务
FCS（Frame Check Sequence）帧校验序列
FDD（Floppy Disk Device）软盘驱动器
FDDI（Fiber-optic Data Distribution Interface）光纤数据分布接口
FDM（Frequency Division Multiplexing）频分多路
FDMA（Frequency Division Multiple Address）频分多址
FDX（Full Duplex）全双工
FEK（File Encryption Key）文件密钥
FEP（Front Effect Processor）前端处理机
FIFO（First In First Out）先进先出
FRC（Frame Rate Control）帧频控制
FTAM（File Transfer Access and Management）文件传输访问和管理
FTP（File Transfer Protocol）文件传输协议

G

GAL（General Array Logic）通用逻辑阵列
GB（Gigabyte）千兆字节
GDI（Graphics Device Interface）图形设备接口
GIF（Graphics Interchange Format）一种图片文件格式，图形转换格式
GIS（Geographic Information System）地理信息系统
GPI（Graphical Programming Interface）图形编程接口
GPIB（General Purpose Interface Bus）通用接口总线
GPS（Global Positioning System）全球定位系统
GSM（Group Special Mobile）分组专用移动通信
GSX（Graphics System Extension）图形系统扩展
GUI（Graphical User Interface）图形用户接口

H

HDC（Hard Disk Control）硬盘控制器
HDD（Hard Disk Drive）硬盘驱动器
HDLC（High-level Data Link Control）高级数据链路控制
HDTV（High-Definition TV）高清晰度电视
HDX（Half DupleX）半双工
HEX（HEXadecimal）十六进制
HTML（Hyper Text Markup Language）超文本标记语言
HTTP（Hyper Text Transport Protocol）超文本传输协议

I

IAP（Internet Access Provider）互联网接入服务商
ICMP（Internet Control Message Protocol）互联网控制消息协议
ICP（Internet Content Provider）互联网内容服务提供商，是 ISP 中提供信息服务的一种机构
IDC（International Development Center）国际开发中心
IDE（Integrated Development Environment）集成开发环境
IDL（Interface Definition Language）接口定义语言
IEEE（Institute of Electrical and Electronics Engineering）电子电气工程师协会
IETF（Internet Engineering Task Force）互联网工程任务组
IIS（Internet Information Service）互联网信息服务
IMAP（Internet Message Access Protocol）互联网信息访问协议
IP（Internet Protocol）互联网协议
IPC（Inter-Process Communication）进程间通信
IPSE（Integrated Project Support Environments）集成工程支持环境
IRP（I/O Request Packets）输入/输出请求包
ISA（Industry Standard Architecture）工业标准结构，是 IBM PC/XT 总线标准
ISDN（Integrated Service Digital Network）综合业务数字网
ISO（International Standard Organization）国际标准化组织
ISO/OSI（International Standard Organization /Open System Interconnection）国际标准化组织/开放系统互联
ISP（Internet Service Provider）互联网服务提供者
IT（Information Technology）信息技术
ITU（International Telecom Union）国际电信联盟
ITV（Interactive TV）交互式电视

J

JDBC（Java Database Connectivity） Java 数据库互连
JDK（Java Developer’s Kit）Java 开发工具包
JIT（Just In Time）即时
JPEG（Joint Photographic Experts Group）联合图片专家组
JVM（Java Virtual Machine）Java 虚拟机

K

KB（Kilobyte）千字节
KMS（Knowledge Management System）知识管理系统

L

LAN（Local Area Network）局域网
LAT（Local Area Transport）本地传输

LCD（Liquid Crystal Display）液晶显示器
LED（Light Emitting Diode）发光二极管
LLC（Logical Link Control sub-layer）逻辑链路控制子层
LSIC（Large Scale Integration Circuit）大规模集成电路
LUT（Look Up Table）查询表

M

MAC（Medium Access Control）介质访问控制
MAN（Metropolitan Area Network）城域网
MB（Megabytes）兆字节（存储容量单位）
MCA（Micro Channel Architecture）微通道结构
MIB（Management Information Bass）管理信息库
MIDI（Musical Instrument Data Interface）乐器数字接口
MIMD（Multiple Instruction Stream，Multiple Data Stream）多指令流，多数据流
MIPS（Millon Instructions Per Second）每秒百万条指令
MIS（Management Information System）管理信息系统
MISD（Multiple Instruction Stream，Single Data Stream）多指令流，单数据流
MMC（Microsoft Management Console）微软管理控制台
MMU（Memory Management Unit）内存管理单元
MPC（Multimedia PC）多媒体计算机
MPEG（Moving Picture Expert Group） 一种视频和音频的国际标准格式
MUD（Multiple User Dimension）多用户空间

N

NAP（Network Access Point）网络访问点
NC（Network Computer）网络计算机
NCSC（National Computer Security Center）国家计算机安全中心
NDIS（Network Device Interface Specification）网络设备接口规范
NFS（Network File System）网络文件系统
NIS（Network Information Services）网络信息服务
NORMA（No Remote Memory Access（multiprocessor））非远程内存访问（多处理器）
NRU（Not Recently Used）非最近使用
NSA（National Security Agency）国家安全局
NSP（Name Server Protocol）名字服务器协议
NTP（Network Time Protocol）网络时间协议
NUMA（Non-Uniform Memory Access（multiprocessor））非一致内存访问（多处理器）

O

OA（Office Automation）办公自动化
ODBC（Open Database Connectivity）开放式数据库互联

ODI（Open Data-link Interface）开放式数据链路接口
OEM（Original Equipment Manufactures）原始设备制造厂家
OLE（Object Linking and Embedding）对象链接与嵌入
OMG（Object Management Group）对象管理组织
OOP（Object Oriented Programming）面向对象程序设计
ORG（Object Request Broker）对象请求代理
OS（Operating System）操作系统
OSI（Open System Interconnection）开放式系统互联
OSPF（Open Shortest Path First）开发最短路径优先

P

PCI（Peripheral Component Interconnect）外部部件互连，是一种局部总线
PDA（Personal Digital Assistant）个人数字助理
PDF（Portable Document Format）便携式文档格式
PDN（Public Data Network）公共数据网
PEM（Privacy Enhanced Mail）私人加密邮件
PIN（Personal Identification Number）个人凭证
POP（Post Office Protocol）邮局协议
POST（Power-On Self-Test）加电自检
PPSN（Public Packed-Switched Network）公用分组交换网
PROM（Programmable ROM）可编程只读存储器

Q

QC（Quality Control）质量控制
QLP（Query Language Processor）查询语言处理器
QoS（Quality of Service）服务质量

R

RAD（Rapid Application Development）快速应用开发
RAI（Remote Application Interface）远程应用程序界面
RAM（Random Access Memory）随机存储器
RAM（Real Address Mode）实地址模式
RAID（Redundant Arrays of Inexpensive Disks）冗余磁盘阵列技术
RCP（Remote Copy）远程复制
RDA（Remote Data Access）远程数据访问
RIP（Routing Information Protocol）路由选择信息协议
RISC（Reduced Instruction Set Computer）精简指令集计算机
ROM（Read Only Memory）只读存储器
ROT（Running Object Table（DCOM））运行对象表（DCOM）
RPC（Remote Procedure Call）远程过程调用

RTS（Request To Send）请求发送

S

SAA（System Application Architecture）系统应用结构
SAF（Store And Forward）存储转发
SAP（Service Access Point）服务访问点
SCSI（Small Computer System Interface）小型计算机系统接口
SDLC（Synchronous Data Link Control）同步数据链路控制
SDK（Software Development Kit）软件开发工具箱
SET（Secure Electronic Transaction）安全电子交易协议
SGML（Standard Generalized Markup Language）标准通用标记语言
SHTTP（Secure Hype Text Transfer Protocol）安全超文本传递协议
SIMD（Single Instruction Stream，Multiple Data Stream）单指令流，多数据流
SISD（Single Instruction Stream，Single Data Stream）单指令流，单数据流
SMB（Server Message Block）服务器消息块
SMDS（Switch Multi-megabit Data Services）交换多兆位数据服务
SMP（Symmetric Multi-Processor）对称式多处理器
SMTP（Simple Mail Transport Protocol）简单邮件传输协议
SN（Sequence Number）序列号
SNA（System Network Architecture）系统网络结构
SNMP（Simple Network Management Protocol）简单网络管理协议
SNTP（Simple Network Time Protocol）简单网络时间协议
SONET（Synchronous Optic Network）同步光纤网
SPC（Stored-Program Control）存储程序控制
SSL（Secure Socket Layer）安全套接字层
SQL（Structured Query Language）结构化查询语言
SSIC（Small Scale Integration Circuit）小规模集成电路
STA（Spanning Tree Algorithm）生成树算法
STDM（Synchronous Time Division Multiplexing）同步时分复用
STP（Shielded Twisted-Pair）屏蔽双绞线

T

TCB（Transmission Control Block）传输控制块
TCP（Transmission Control Protocol）传输控制协议
TCP/IP（Transmission Control Protocol /Internet Protocol）传输控制协议/网间协议
TDM（Time Division Multiplexing）时分多路复用
TDMA（Time Division Multiplexing Address）时分多址技术
TDR（Time-Domain Reflectometer）时间域反射测试仪
Telcos（Telecommunications Companies）电子通信公司
TIG（Task Interaction Graph）任务交互图

TLI（Transport Layer Interface）传输层接口
TSR（Terminate and Stay Resident）终止并驻留
TTL（Transistor-Transistor Logic）晶体管—晶体管逻辑电路
TWX（Teletypewriter Exchange）电传电报交换机

U

UART（Universal Asynchronous Receiver Transmitter）通用异步收发器
UDF（Universal Disk Format）通用磁盘格式
UDP（User Datagram Protocol）用户数据报协议
UHF（Ultrahigh Frequency）超高频
UIMS（User Interface Management System）用户接口管理程序
UNI（User Network Interface）用户网络接口
UPS（Uninterruptible Power Supply）不间断电源
URI（Uniform Resource Identifier）统一资源标识符
URL（Uniform Resource Locator）统一资源定位器
USB（Universal Serial Bus）通用串行总线
UTP（Unshielded Twisted-Pair）非屏蔽双绞线

V

VAD（Virtual Address Descriptors）虚拟地址描述符
VAN（Value Added Network）增值网络
VAP（Value-Added Process）增值处理
VAS（Value-Added Server）增值服务
VCPI（Virtual Control Program Interface）虚拟控制程序接口
VCR（Video Cassette Recorder）录像机
VDD（Virtual Device Drivers）虚拟设备驱动程序
VDR（Video Disc Recorder）光盘录像机
VDT（Video Display Terminals）视频显示终端
VFS（Virtual File System）虚拟文件系统
VGA（Video Graphics Array）彩色显示器，分辨率为 640×480
VGA（Video Graphics Adapter）视频图形适配器
VHF（Very High Frequency）甚高频
VHS（Video Home System）家用录像系统
VIS（Video Information System）视频信息系统
VLAN（Virtual LAN）虚拟局域网
VLSI（Very Large Scale Integration）超大规模集成
VOD（Video On Demand）视频点播系统
VON（Voice On Net）网上通话
VPN（Virtual Private Network）虚拟专用网
VR（Virtual Reality）虚拟现实

VRUs（Voice Response Units）语音应答系统
VTP（Virtual Terminal Protocol）虚拟终端协议
VxD（Virtual Device Driver）虚拟设备驱动程序

W

WAN（Wide Area Network）广域网
WAE（Wireless Application Environment）无线应用环境
WAIS（Wide Area Information Service）广义信息服务，数据库检索工具
WAP（Wireless Application Protocol）无线应用协议
WDM（Wavelength Division Multiplexing）波分多路复用
WDP（Wireless Datagram Protocol）无线数据包协议
WML（Wireless Markup Language）无线标记语言
WORM（Write Once, Read Many time）写一次读多次光盘
WWW（World Wide Web）万维网
WYSIWYG（What You See Is What You Get）所见即所得

X

XGA（eXtended Graphics Array）扩展图形阵列
XML（eXtensible Markup Language）可扩展标记语言
XMS（eXtended Memory Specification）扩展存储器规范
XQL（eXtensible Query Language）可扩展查询语言

Z

ZA（Zero and Add）清零与加指令
ZBR（Zone Bit Recording）零位记录制

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